REMARKS

By this Amendment, claims 1-34 are cancelled, and claims 35-68 are added. Thus, claims 35-68 are active in the application. Reexamination and reconsideration of the application are respectfully suggested.

The specification and abstract have been carefully reviewed and revised in order to correct grammatical and idiomatic errors in order to aid the Examiner in further consideration of the application. The amendments to the specification and abstract are incorporated in the attached substitute specification and abstract. No new matter has been added.

Also attached hereto is a marked-up version of the substitute specification and abstract illustrating the changes made to the original specification and abstract.

In item 3 on page 2 of the Office Action, claims 1-34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Berstis (U.S. 6,182,122) in view of Schweitzer et al. (6,481,467). This rejection is believed to be moot in view of the cancellation of claims 1-34. Furthermore, the Applicants respectfully submit that this rejection is inapplicable to new claims 35-68 for the following reasons.

As described in paragraph [0003] of the original specification and beginning at line 9 on page 2 of the substitute specification, conventional data transmission systems can use a plurality of communications circuits, but the conventional data transmission systems do not efficiently use an optimal communications circuit since data is unconditionally sent out to the same communications circuit regardless of the number of users that are receiving the data. Accordingly, the server in the conventional data transmission system transmits data on a communications circuit which is unsuitable for the transmission of the data when the bandwidth thereof is limited or when a number of users are requesting the same data.

Therefore, an object of the present invention is to provide a data transmission system and method which achieves an efficient use of a communications circuit in terms of transmission bandwidth and which can allow users to download the data from a server less expensively.

The present invention, as recited in new claims 35, 52, 60 and 68, achieves this object by providing a data transmission system and method in which a server is operable

to transmit content data or a content data set, which includes a plurality of content data each varying in content, that is designated by a content reservation request which is issued from a data terminal device for the content data or the content data set. The content data or the content data set is transmitted by the server through one of a plurality communications circuits to a data circuit terminating device which is connected to the data terminal device for storing the content data or the content data set.

The data transmission system and method of new claims 35, 52, 60 and 68 recite that each of the plurality of communications circuits is operable to communicate the content data or the content data set to the data terminal device. In addition, the data transmission system and method of new claims 35, 52, 60 and 68 further recite that each of the plurality of communications circuits is operable to provide communication between the server and the data terminal device through different means.

Further, as recited in new claims 35 and 60, either the server or any one of the plurality of communications circuits comprises a scheduling part which is operable to determine, based on both a time limit that is indicated by the content reservation request and predetermined communications information, a transmission time and one of the plurality of communications circuits which provides the most optimal means for communication between the server and the data circuit terminating device so as to ensure that the content data or content data set is completely transmitted by the indicated time limit.

As recited in new claims 52 and 68, in either the server or any one of the plurality of communications circuits, the data transmission method comprises determining, based on both a managed time limit and predetermined communications information, a transmission time and one of the plurality of communications circuits which provides the most optimal means for communication between the server and the data circuit terminating device so as to ensure that the content data or the content data set is completely transmitted by the indicated time limit.

Accordingly, the present invention, as recited in new claims 35, 52, 60 and 68, provides that each of the plurality of communications circuits is operable to communicate the content data or the content data set to the data terminal device, that each of the plurality of communications circuits is operable to provide that each of the plurality of

communications circuits is operable to provide communication between the server and the data terminal device through different means, and that a determination is made as to a transmission time and one of the plurality of communications circuits which provides the most optimal means for communication between the server and the data circuit terminating device so as to ensure that the content data or the content data set is completely transmitted by the indicated time limit.

Berstis discloses a data transmission system which seeks to avoid the conventional problems that are associated with numerous users trying to download a number of selected web pages during off-peak hours to be able to browse such Web pages offline. The system of Berstis precaches selected web pages from periodically updated Web sites which are likely to be accessed by a user on the server. In response to offline browsing requests by subscribers, the pages or portions thereof which have not already been transmitted to the subscribers are prioritized by the likelihood of being accessed. The prioritization of Berstis is performed by utilizing statistical information, link relationships, and/or content. The pages are compressed in the server to minimize the amount of time that is required for the subscribers to retrieve the requested pages (see Column 3, lines 1-12 and Column 8, lines 12-51).

The system of Berstis includes a plurality of user units 102, 104, 106 and 108, a public switched telephone network (PSTN) 118 and a plurality of communication links 110, 112, 114 and 116 which respectively connect the user units to the PSTN 118. The user units 102, 104, 106 and 108 communicate with the PSTN 118 via their respective communication links 110, 112, 114 and 116, and through the PSTN 118, the user units are able to communicate with a server 120 via a communication link 122 (see Column 3, lines 55-67 and Figure 1). According to the Examiner's labeling of the elements of Berstis, it appears that the Examiner is interpreting the communication link 122 and perhaps the PSTN 118 and the plurality of user units 102, 104, 106 and 108 as corresponding to the plurality of communications circuits as recited in the claims of the present invention.

However, as discussed above, new claims new claims 35, 52, 60 and 68 recite that each of the plurality of communications circuits is operable to communicate the content data or the content data set to the data terminal device and that each of the plurality of

communications circuits is operable to provide communication between the server and the data terminal device through different means. Accordingly, the data transmission system and method of the present invention, as recited in new claims 35, 52, 60 and 68, provides that there are a plurality of communication circuits between the server and the data circuit terminating device, where any of the plurality of communications circuits is operable to provide communication between the server and the data circuit terminating device, and where each of the plurality of communications circuits provides communication through different means between the server and the data terminal device.

Even though Berstis discloses a plurality of communication links 110, 112, 114 and 116, the plurality of communication links can respectively provide communication with only one data terminal device. That is, as clearly disclosed in Figure 1 of Berstis, communication link 110 provides communication between only user unit 102 and the server 120, and, similarly, communication link 112 provides communication between only user 104 and the server 120. Accordingly, Berstis clearly does not disclose or suggest that a single user unit (a data terminal device) is able to communicate with a plurality of communications circuits.

Therefore, Berstis clearly does not disclose or suggest that that each of the plurality of communications circuits is operable to communicate the content data or the content data set to the data terminal device, as recited in new claims 35, 52, 60 and 68.

Further, Berstis also does not disclose or suggest that that each of the plurality of communications circuits is operable to provide communication between the server and the data terminal device through different means. Instead, since each communication link 110, 112, 114 and 116 connects the user units 102, 104, 106 and 108 to the same PSTN 118, each of the communication links 110, 112, 114 and 116 is identical at least with respect to their means of communication.

Therefore, Berstis also clearly does not disclose or suggest that each of the plurality of communications circuits is operable to provide communication between the server and the data terminal device through different means, as recited in new claims 35, 52, 60 and 68.

Moreover, Berstis also does not disclose or suggest that in either the server or any one of the plurality of communication circuits that there is a determination, based on both

a managed time limit and predetermined communications information, of a transmission time and one of the plurality of communications circuits which provides the most optimal means for communication between the server and the data circuit terminating device so as to ensure that the content data or the content data set is completely transmitted by the indicated time limit, as recited in new claims 35, 52, 60 and 68.

Accordingly, Berstis clearly does not disclose or suggest each and every limitation of new claims 35, 52, 60 and 68.

The Examiner applied Schweitzer et al. to cure the deficiencies of Berstis for also failing to disclose or suggest ensuring that the content data or the content data set is completely transmitted. Schweitzer et al. discloses a network accounting and billing system and method in which network traffic information is captured at network information sources. The network information sources provide detailed information about the network communications traffic. Manger devices are provided to manage gatherer devices which correlate gathered information with accounting information. New services can be provided to users based on documented usage trends by analyzing traffic routes (see Column 2, lines 28-52 and Column 3, lines 43-39).

Schweitzer et al., however, similar to Berstis, also does not disclose or suggest that each of the plurality of communications circuits is operable to communicate the content data or the content data set to the data terminal device and that each of the plurality of communications circuits is operable to provide communication between the server and the data terminal device through different means, as recited in new claims 35, 52, 60 and 68.

Further, Schweitzer et al., similar to Berstis, also does not disclose or suggest determining, based on both a managed time limit and predetermined communications information, a transmission time and one of the plurality of communications circuits which provides the most optimal means for communication between the server and the data circuit terminating device so as to ensure that the content data or the content data set is completely transmitted by the indicated time limit, as recited in new claims 35, 52, 60 and 68.

Therefore, Schweitzer et al. clearly does not cure the deficiencies of Berstis for failing to disclose or suggest each and every limitation of new claims 35, 52, 60 and 68.

Accordingly, no obvious combination of Berstis and Schweitzer et al. would result in the inventions of new claims 35, 52, 60 and 68 since Berstis and Schweitzer et al., either individually or in combination, fail to disclose or suggest each and every limitation of new claims 35, 52, 60 and 68.

Therefore, new claims 35, 52, 60 and 68 are clearly patentable over Berstis and Schweitzer et al.

The present invention, as recited in new claims 53 and 59, also achieves the above-described object by providing a data transmission system and method in which content data that is designated by a content reservation request issued from any number of a plurality of data terminal devices is transmitted from a server to the plurality of data terminal devices through a communications circuit. New claims 53 and 59 recite that the content reservation request indicates a download condition which is indicative of at least one of a transmission time and a transmission cost for downloading the designated content data.

Further, new claims 53 and 59 also each recite collecting from the number of the plurality of data terminal devices a corresponding number of content reservation requests each indicating a download condition for downloading the content data to the plurality of data terminal devices, respectively, and determining, based on at least one managed download condition, a transmission timing which ensures that the content data transmitted under the at least one download condition is completely received by the number of the plurality of data terminal devices in accordance with the download condition indicated by the content reservation request received from each of the number of data terminal devices.

The Examiner refers to Column 7 of Berstis as the basis for concluding that Berstis discloses the content reservation request of the present invention. With reference to Column 7 of Berstis, it appears that the Examiner is construing the registration list of Berstis as corresponding to either the claimed content reservation request or content reservation status data. However, for the following reasons, the Applicants respectfully disagree with the Examiner's characterization of the registration list of Berstis.

The registration list of Berstis, as described in Column 7, lines 10-15, contains identifications of information pertaining to what Web pages clients or users regularly

download, the number of registered users, and a list of URLs for various Web pages are frequently requested by a user or a client. Further, Column 7, lines 17-18 discloses that a registration list may be generated when a specific user makes a request for entries to be added to the registration list. Accordingly, the registration list of Berstis is effectively a list of items that are to be precached at the server.

The registration list of Berstis, however, is maintained at the server 120. Further, the registration list is not transmitted from the server 120 to the user units 102, 104, 106 and 108, and the registration list is not transmitted from the user units 102, 104, 106 and 108 to the server 120.

However, as recited in new claims 53 and 59, the content reservation status data which lists at least one download condition for content data that is available for transmission is transmitted from the status data generation part to the data terminal device. A content reservation request indicating a downloading condition is transmitted from the data terminal device to the server. Accordingly, the status data generation part presents the content reservation status data to the data terminal device in the form of a list of possible download conditions from which to choose, and the data terminal device sends to the server a content reservation request indicating which download condition is to be used. These features as recited in new claims 53 and 59, however, are not disclosed or suggested in Berstis.

Accordingly, Berstis clearly does not disclose or suggest generating content reservation status data listing at least one download condition for content data that is available for transmission, and transmitting the generated content reservation status data to the number of the plurality of data terminal devices, as recited in new claims 53 and 59.

Furthermore, Berstis also does not disclose or suggest determining, based on the at least one managed download condition, a transmission timing which ensures that the content data transmitted under the at least one download condition is completely received by the number of the plurality of data terminal devices in accordance with the download condition indicated by the content reservation request received from each of the number of data terminal devices, as recited in new claims 53 and 59.

Therefore, Berstis clearly fails to disclose or suggest each and every limitation recited in new claims 53 and 59.

Furthermore, Schweitzer et al., similar to Berstis, also does not disclose or suggest generating content reservation status data listing at least one download condition for content data that is available for transmission, and transmitting the generated content reservation status data to the number of the plurality of data terminal devices, as recited in new claims 53 and 59. In addition, Schweitzer et al., similar to Berstis, also does not disclose or suggest determining, based on the at least one managed download condition, a transmission timing which ensures that the content data transmitted under the at least one download condition is completely received by the number of the plurality of data terminal devices in accordance with the download condition indicated by the content reservation request received from each of the number of data terminal devices, as recited in new claims 53 and 59.

Therefore, Schweitzer et al. clearly does not cure the deficiencies of Berstis for failing to disclose or suggest each and every limitation of new claims 53 and 59. Accordingly, no obvious combination of Berstis and Schweitzer et al. would result in the inventions of new claims 53 and 59 since Berstis and Schweitzer et al., either individually or in combination, fail to disclose or suggest each and every limitation of new claims 53 and 59.

Accordingly, in view of the clear distinctions discussed above, the Applicants respectfully submit that new claims 35, 52-53, 59-60 and 68 are clearly patentable over Berstis and Schweitzer et al.

Furthermore, because of the clear distinctions discussed above, it is submitted that the distinctions are such that a person having ordinary skill in the art at the time the invention was made would not have been motivated to modify Berstis and Schweitzer et al. in such as manner as to result in, or otherwise render obvious, the present invention as recited in new claims 35, 52-53, 59-60 and 68. Therefore, it is submitted that the new claims 35, 52-53, 59-60 and 68, as well as new claims 36-51, 54-58 and 61-67 which depend therefrom, are clearly allowable over the prior art as applied by the Examiner.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice thereof is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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TITLE OF THE INVENTION

DATA TRANSMISSION SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

~~[0001]~~ The present invention relates to data transmission systems and, more specifically, to a data transmission system for transmitting data ~~transmission~~ from a server to a data circuit terminating equipment that is connected to a data terminal equipment. Here, the data that is transmitted from the server is the data that is ~~one~~ reserved by the data terminal equipment ~~for data transmission from the server~~.

Description of the Background Art

~~[0002]~~ There have been proposed various data transmission systems which are of a type as described above. An ~~Here, taken as an~~ example is the data transmission system disclosed in Japanese Patent Laid-Open Publication No. 8-140081 (96-140081), which includes a device in an information source (hereinafter, referred to as server), and an information storage unit which receives the information on the user's side. The server and the information storage unit are connected to each other over a network. The server waits for users' requests for data transmission until a data distribution time~~,~~ which has been set under a predetermined manner. Even if one request comes, the server waits for other requests

~~others requesting~~ for the transmission of the same data for the set time period. When the data distribution time comes, the server sends the requested data onto a communications circuit. Then, the information storage unit on the user's side receives and stores the data therein. Accordingly~~As such~~, in such a conventional data transmission system, the server can selectively perform data transmission in a time period when, before the data distribution time, the communications circuit is not congested. In this manner, the communications circuit can be efficiently utilized.

~~[0003]~~ The issue here is that~~,~~ the communications circuit varies in characteristics depending on its type. As an example, a wired public circuit typified by ISDN is not suited for multicasting. This is because~~,~~ any transmission bandwidth of a number of ~~many~~ data channels in the public circuit is occupied by multicasting, thereby simultaneously transmitting the same data to many users using the public communications circuit. Unlike the wired public circuit, a satellite circuit may be a possibility for multicasting since data transmission is performed through the shared use of a transmission bandwidth. However, the conventional data transmission system still bears a problem of not efficiently utilizing the transmission bandwidth of the communications circuit since data is unconditionally sent out to the same communications circuit regardless of the number of users receiving the data. Here, assume that the data transmission system only has a wired public circuit ~~only~~. In such a case, a server in the system has to transmit

data through the wired public circuit regardless of whether ~~no matter if~~ multicasting is preferable, which results ~~resulting~~ in a waste of transmission bandwidth.

~~[0004]~~ The conventional data transmission system bears another problem regarding a communications expense. In a case where a user wants to download relatively large data such as moving pictures, the communications expense therefor is high.

SUMMARY OF THE INVENTION

~~[0005]~~ Therefore, an object of the present invention is to provide a data transmission system which achieves an efficient use of a communications circuit in terms of transmission bandwidth, and data download from a server at a lesser ~~less~~ expense.

~~[0006]~~ The present invention has the following features to attain the object described above.

~~[0007]~~ A first aspect of the present invention is directed to a data transmission system in which a server sends out, onto any one of a plurality of communications circuits, content data that is designated by a content reservation request to a data circuit terminating equipment connected to a data terminal equipment for storage.~~, wherein~~

The ~~the~~ content reservation request additionally indicates a time limit in which ~~by when~~ the content data that is designated by the data terminal equipment is to be ready in the data circuit terminating equipment.~~,~~

Either ~~either~~ the server or any one of the communications circuits of the first aspect ~~comprises:~~

——————————a time limit management part for managing the time limit that is designated by the content reservation request from the data terminal equipment; and

——————————a scheduling part for determining, based on ~~the basis of~~ both the time limit that is managed in the time limit management part and predetermined communications information, a transmission timing which ensures that the content data completely transmitted by the time limit and an optimal communications circuit from among ~~from~~ the plurality communications circuits.~~, and~~

Further,~~—~~ the server comprises a data send out part for sending out the content data onto the optimal communications circuit according to the transmission timing that is determined by the scheduling part.

~~[0008]~~ A second aspect of the present invention is directed to a data transmission system in which content data that is designated by a content reservation request is transmitted from a server to a data terminal equipment through a communications circuit.~~, wherein~~

The ~~the~~ content reservation request additionally indicates a download condition for downloading the content data that is designated by the data terminal equipment.~~:~~

The ~~the~~ data transmission system of the second aspect comprises ~~:~~

a content reservation status data generation part for generating content reservation status data indicating the download condition for the content data based on ~~the basis of~~ the received content reservation request. The data transmission system of the second aspect also comprises ~~which has been received; and~~

a data transmission part for transmitting the content reservation status data that is generated by the content reservation status data generation part to the data terminal equipment.~~,~~

By ~~by~~ comprising the content reservation status data generation part and the data transmission part, the transmission system induces other data terminal equipment by showing that the content data is available under the download condition.~~, and~~

The data ~~the~~ transmission system of the second aspect further comprises:

a DL condition management part for managing the content data and the download condition that is designated (indicated) by the content reservation request from the data terminal equipment;

a scheduling part for determining, based on the ~~basis of the~~ download condition managed in the DL condition management part, a transmission timing which ensures that the content data is transmitted under the download condition;~~,~~ and

a data send out part for sending out the content

data onto the communications circuit according to the transmission timing that is determined by the scheduling part.

~~[0009]~~ These and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

~~[0010]~~ FIG. 1 is a diagram showing the entire configuration of a data transmission system according to a first embodiment of the present invention;

FIG. 2 is a block diagram showing the configuration of a data circuit terminating equipment (DCE) 3 of FIG. 1:

FIG. 3 is a block diagram showing the configuration of a content server 6 of FIG. 1;

FIG. 4 is a diagram showing the configuration of a content data CD which is stored in a content storage 64 of FIG. 3;

FIG. 5 is a schematic diagram of an addressee list L_{DEST} which is stored in an addressee list storage 65 of FIG. 3;

FIG. 6 is a schematic diagram of a charge list L_{PAY} which is stored in a charge list storage 66 of FIG. 3;

FIG. 7 is a schematic diagram of a transmission expense list L_{TC} which is stored in a transmission expense list storage 67 of FIG. 3;

FIG. 8 is a schematic diagram of a transmission initial

expense list L_{ITC} which is stored in a transmission initial expense list storage 68 of FIG. 3;

FIG. 9 is a first half of a sequence chart showing a communications procedure in the data transmission system of FIG. 1;

FIG. 10 is a second half of the sequence chart showing the communications procedure in the data transmission system of FIG. 1;

FIG. 11 is a flowchart showing step ST1 of FIG. 9 in more detail for its processing procedure;

FIG. 12 is a diagram for demonstrating the contents of content reservation status data D_{RS} of FIG. 9;

FIGS. 13a to 13g are diagrams for demonstrating the configuration of data and signals that are shown in both FIGS. 9 and 10;

FIG. 14 is a flowchart showing step ST13 of FIG. 9 in more detail for its processing procedure;

FIG. 15 is a flowchart showing step ST8 of FIG. 10 in more detail for its processing procedure;

FIGS. 16a to 16c are diagrams each showing a unit record UR_1 which is updated or newly-generated in step ST8 of FIG. 15;

FIG. 17 is a flowchart showing step ST9 of FIG. 10 in more detail for its processing procedure;

FIG. 18 is a flowchart showing step ST92 of FIG. 17 in more detail for its processing procedure;

FIGS. 19a and 19b are diagrams for demonstrating a communications circuit flag F_{CIR} that is set by the processing of FIG. 18;

FIGS. 20a and 20b are diagrams schematically showing the processing of steps ST94 to ST99 of FIG. 17 ~~by its processing~~;

FIG. 21 is a flowchart showing step ST10 of FIG. 10 in more detail for its processing procedure;

FIG. 22 is a flowchart showing step ST11 of FIG. 10 in more detail for its processing procedure;

FIGS. 23a to 23c are drawings demonstrating a content data set CDS according to ~~in~~ a second embodiment of the present invention;

FIG. 24 is a block diagram showing the configuration of a DCE 3 in the second embodiment;

FIG. 25 is a first half of a sequence chart showing a communications procedure in a data transmission system of the second embodiment;

FIG. 26 is a second half of the sequence chart showing the communications procedure in the data transmission system of the second embodiment;

FIGS. 27a and 27b are diagrams demonstrating a selection condition list L_{SC} which is stored in a selection condition list storage 36 of FIG. 24;

FIG. 28 is a flowchart showing step ST22 of FIG. 25 in more detail for its processing procedure;

FIG. 29 is a flowchart showing step ST11′ of FIG. 26 in more detail for its processing procedure;

FIG. 30 is a diagram showing an allocation list L_{ST} which is stored in an allocation list storage 37 of FIG. 24;

FIG. 31 is a flowchart showing step ST23 of FIG. 26 in more detail for its processing procedure;

FIG. 32 is a flowchart showing step ST14′ of FIG. 26 in more detail for its processing procedure;

FIG. 33 is a diagram showing a specific example of a content data set which is stored in a content storage 35 of FIG. 24; and

FIG. 34 is a diagram showing a specific example of a content data CD that is sent out from a user interface 32 of FIG. 24.

DETAILED DESCRIPTION OF THE INVENTION~~DESCRIPTION OF THE PREFERRED EMBODIMENTS~~

First Embodiment

~~[0011]~~ FIG. 1 is a diagram showing the entire configuration of a data transmission system according to a first embodiment of the present invention. In FIG. 1, the data transmission system includes a data terminal equipment (hereinafter, referred to as DTE, ~~herein~~ two DTEs are illustrated herein) 1, a wired or wireless transmission path 2, a data circuit terminating equipment (hereinafter, referred to as DCE) 3, a first and a second

communications circuit ~~circuits~~ 4 and 5 which are exemplified herein as ~~for~~ a plurality of communications circuits, ~~in claims,~~ and a content server (hereinafter, simply referred to as server) 6.

~~[0012]~~ The DTE 1 is operable by a user as is a personal computer, and carries out output processing on a content data CD (see FIG. 4) that is downloaded from the server 6 so as to output to the user what the content data CD presents. The DTE 1 is connected to the DCE 3 through the transmission path 2 for bidirectional data communications therebetween.

~~[0013]~~ The DCE 3 is connected to at least one exchange system 41 (as will be described later ~~described~~), and performs bidirectional data communications with the server 6 through the first communications circuit 4. In the DCE 3, power is supplied for operation, preferably, from the first communications circuit 4, which is wired. The DCE 3 is also connected to a reception antenna 53 (as will be ~~later~~ described below), and receives data from the server 6 through the second communications circuit 5. The DCE 3 includes, as shown in FIG. 2, a processing unit 31, a user interface 32, a circuit interface 33, a reception unit 34, and a content storage 35.

~~[0014]~~ The ~~Such~~ DTE 1 and DCE 3 are placed on the user's side (typically in the user's house) as shown in FIG. 1. Here, the DTE 1 may be plurally provided. FIG. 1 shows a set thereof only for one user for convenience, but the actual data transmission

system of the first embodiment includes many sets of equipment, which are at least one DTE 1 and the DCE 3, on the user side. Each of the equipment that is provided on the user's side is assigned, in advance, a unique identifier ID_{USER} for user identification. In the first ~~this~~ embodiment, the identifier ID_{USER} that is assigned to the set of the DTEs 1 and the DCE 3 of FIG. 1 is presumably α_1.

~~[0015]~~ The first communications circuit 4 is a wired public circuit having several exchange systems 41 provided therein. These ~~Those~~ exchange systems 41 are connected to one another via a communications line that is typified by an optical fiber cable, a twisted pair wire, and/or a coaxial cable. The ~~Such~~ first communications circuit 4 is suited for transmitting each different content data CD to many DTEs 1 due ~~thanks~~ to the exchange systems 41 each performing routing. However, the first communications circuit 4 is not suited for multicasting. This is because~~,~~ if the server 6 simultaneously distributes the same content data CD to many DTEs 1 over the first communications circuit 4, any transmission bandwidth of a number of ~~many~~ data channels is occupied by data distribution.

~~[0016]~~ The second communications circuit 5 includes, in the first ~~this~~ embodiment, a transmission antenna 51, and a satellite circuit including an artificial satellite 52 and the reception antenna 53. Unlike the first communications circuit 4, however, the second communications circuit 5 is suitable for multicasting

and ~~as~~ allows a shared use of a bandwidth for the transmission of the same content data CD to many DTEs 1. However, the second communications circuit 5 is not good for transmitting each different content data CD to many DTEs 1 as the ~~a~~ transmission bandwidth of the second communication circuit 5 ~~thereof~~ is sharable by all of the plurality of ~~those~~ DTEs 1. If various content data CDs are sent out onto the second communications circuit 5, it will soon be short of the transmission bandwidth. Here, as shown in FIG. 1, the DCE 3, and the first and second communications circuits 4 and 5 configure a data transmission network 7.

~~[0017]~~ The server 6 is placed on the information provider's side from where the content data CD is distributed to the users', side and is previously assigned a unique identifier ID_{SERVER} for server identification. The server 6 is connected to at least one exchange system 41, and performs bidirectional data communications with the DCE 3 through the first communications circuit 4. The server 6 is also connected to the transmission antenna 51, and transmits data to the DTE 1 over the second transmission circuit 5. As shown in FIG. 3, the server 6 includes a processing unit 61, a circuit interface 62, a transmission unit 63, a content storage 64, an addressee list storage 65, a charge list storage 66, a transmission expense list storage 67, and a transmission initial expense list storage 68.

~~[0018]~~ As shown in FIG. 4, the content storage 64 stores several types of content data CDs. The content data CD is typically moving

picture data, static picture data, audio data, object data, character data, or a combination of two or more of such data. Also, the content data CD is provided with at least an identifier ID_{CD} and a data size I_{DS}. The identifier ID_{CD} uniquely specifies a recording location where the content data CD is stored in the content storage 64. The data size I_{DS} shows the content data CD by size. In the first ~~this~~ embodiment, as shown by the accompanying drawings, content data CD_A and CD_B are stored in the content storage 64 ~~are content data CD_A and CD_B~~. Here, presumably, the content data CD_A is provided with β_1 for the identifier ID_{CD} and γ_1 for the data size I_{DS}, while the content data CD_B is provided with β_2 and γ_2 for the identifier ID_{CD} and the data size I_{DS}, respectively.

~~[0019]~~ The addressee list storage 65 corresponds ~~is corresponding~~ to a time limit management part and a DL condition management part herein ~~in claims~~, and stores an addressee list L_{DEST} therein. As shown in FIG. 5, the addressee list L_{DEST} is composed of several unit records UR_1, which are ~~herein~~ exemplarily described herein as UR_{11} to UR_{13}. Each unit record UR_1 indicates what ~~are~~ the conditions are for downloading the content data CD therein. Specifically, included in each of the unit records UR_1 are a download condition number (hereinafter, referred to as DL condition number) N_{DL}, an identifier ID_{CD}, a time limit LT, a transmission expense TC, at least one identifier ID_{USER}, and a communications circuit flag F_{CIR}. Herein, the DL condition number N_{DL} uniquely specifies the unit record UR_1, and the identifier ID_{CD} specifies which content

data CD corresponds to ~~is at~~ a user's request for data transmission. The time limit LT is a user designated time for the content data CD at the user's request to be ready in the content storage 35 of the DCE 3. The identifier ID_{USER} shows, specifically in the addressee list L_{DEST}, the DCE 3 which receives the content data CD. The transmission expense TC indicates how much the user is to be charged for the content data CD that is transmitted from the server 6 to the DCE 3. The communications circuit flag F_{CIR} indicates which of the communications circuits 4 or 5 ~~circuit~~ is to be used for the transmission of the content data CD. In the first ~~this~~ embodiment, presumably, a value of 1 for the communications circuit flag F_{CIR} indicates the first communications circuit 4, while a value of 0 for the communication circuit flag F_{CIR} indicates the second communications circuit 5 (refer to FIGS. 19a and 19b).

~~[0020]~~ In this example of FIG. 5, specifically, the unit record UR_{11} shows β_1 for the identifier ID_{CD}, 18:00 on February 17 for the time limit LT, and α_2 to $\alpha_{\text{~~20~~500}}$ for the identifier ID_{USER}. Here, α_2 to α_{500} mean 499 sets of equipment, which are exclusive of the set α_1 in FIG. 1. Accordingly, the content data CD_A is transmitted, by 18:00 on February 17, to 499 DCEs 3 that are specified by the identifier ID_{USER}. Further, the unit record UR_{11} shows ¥450 for the transmission expense TC, which means the current transmission expense of the content data CD_A for those 499 DCEs is ¥450. Here, the unit records UR_{12} and UR_{13} are not described as they are similar

to the unit record UR_{11}. Note that, the unit records UR_1 which are exemplified herein show only the identifier ID_{CD} of β_1, which means that no user is requesting for the transmission of the content data CD_B.

~~[0021]~~ The charge list storage 66 stores a charge list L_{PAY}. As shown in FIG. 6, the charge list L_{PAY} is composed of charge information I_{PAY} for every identifier ID_{USER}. The charge information I_{PAY} indicates how much a user that is specified by the corresponding identifier ID_{USER} needs to pay, in total, for the content data CD(s) that the user ~~his/her~~ downloaded in a predetermined time period. Note herein that, for easy understanding, the charge information I_{PAY} presumably indicates the total amount of the transmission expense TC. This is not restrictive, and other types ~~type~~ of expenses (i.e., a copyright fee) may be included therein.

The charge list L_{PAY} in FIG. 6 exemplifies a case where the identifier ID_{USER} is α_1, and the charge information I_{PAY} therefor is ¥1,500. Cases for other identifier ID_{USER} are not described here for the sake of convenience.

~~[0022]~~ The transmission expense list storage 67 stores a transmission expense list L_{TC}. As shown in FIG. 7, the transmission expense list L_{TC} indicates that the transmission expense TC varies ~~varying~~ with the number of users N_{USER} that request ~~requesting for~~ data transmission. In the first ~~this~~ embodiment, the number of users N_{USER} is put into 5 classes of N_{USER1} to N_{USER5}, depending on

the number of users. As an example, the number of users N_{USER1} covers a range of 1 to 19 users, and the transmission expense TC therefor is fixed at ~~fixedly~~ ¥550. FIG. 7 illustrates an example the respective transmission expenses TC for ~~For~~ other classes of the number of users N_{USER2} to N_{USER5}~~, FIG. 7 is referred to~~.

~~[0023]~~ The transmission initial expense list storage 68 stores a transmission initial list L_{ITC}, which shows the transmission expense TC in its initial value. As shown in FIG. 8, the transmission initial expense list L_{ITC} shows that the transmission initial expense varies ~~varying~~ with a time margin TM, which is a length of time that is measured from the server 6 receiving a user's content reservation request RS_{TR} to the time limit LT designated thereby. In the first ~~this~~ embodiment, the time margin TM is put into 5 classes of TM_1 to TM_5, depending on the amount of the time margin TM~~number~~. For example, the time margin TM_1 covers a range of 0 to 12 (hour), and the transmission initial expense ITC_1 therefor is fixed at ~~fixedly~~ ¥550. FIG. 8 illustrates an example of the respective transmission initial expenses ITC for ~~For~~ other classes of the time margins ~~margin~~ TM_2 to TM_5~~, FIG. 8 is referred to~~.

~~[0024]~~ Described next with reference to the sequence charts of FIGS. 9 and 10 is the communications procedure for the DTE 1 to retrieve a content data CD in the above-structured data transmission system~~ with reference to sequence charts of FIGS. 9 and 10~~. First, in FIG. 9, in response to a request coming from

the DTE 1 (not shown), the server 6 generates content reservation status data D_{RS} based on an addressee list L_{DEST} that is currently stored (step ST1). Step ~~This step~~ ST1 corresponds to a content reservation status data generation part herein~~in claims~~, and FIG. 11 shows the processing procedure thereof in detail. In FIG. 11, the processing unit 61 of the server 6 extracts, from each unit record UR_1 that is found in the addressee list L_{DEST} (see FIG. 5), a DL condition number N_{DL}, a time limit LT, and a transmission expense TC (step ST110). Next, the processing unit 61 generates a download condition list (hereinafter, referred to as a DL condition list) L_{DL} for every extracted set of the DL condition number N_{DL}, the time limit LT, and the transmission expense TC (step ST120). The DL condition list specifies what are the conditions for downloading any content data CD.

~~[0025]~~ After step ST120, the processing unit 61 generates content reservation status data D_{RS} (step ST130). As shown in FIG. 12, the content reservation status data D_{RS} represents each DL condition list L_{DL} that is generated in step S120 and displayed on the side of DTE 1. With this DL condition list L_{DL}, the user can easily find the DL condition list L_{DL} that best meets ~~meeting~~ his/her needs ~~best~~. Here, the content reservation status data D_{RS} is generated in such a manner that the DTE 1 can generate a content reservation request RS_{TR}, which will be described later ~~described~~, in response to the user's designation of the ~~designating~~ DL condition number N_{DL}. Preparing for a case where the user does

not find a ~~finds no~~ DL condition list L_{DL} matching his/her needs, the content reservation status data D_{RS} is ~~so~~ structured so that the user himself/herself can designate the content data CD and the time limit LT by operating the DTE 1. This is the end of the processing of step ST1.

~~[0026]~~ Here, assume that the processing unit 61 generates such content reservation status data D_{RS} based on the unit records UR_{11} to UR_{13} shown in FIG. 5. In this case, after the DTE 1 executes ~~executed~~ display processing on the content reservation status data D_{RS}, ~~displayed on a screen of the DTE 1 are~~ three DL condition lists ~~list~~ L_{DL1} to L_{DL3} as shown in FIG. 12 are displayed on a screen of the DTE 1. Here, the DL condition list L_{DL1} for the content data CD_A indicates 18:00 on February 17 for the time limit LT, and ¥450 for the transmission expense TC. Here, the DL condition list DL_2 and DL_3 are not described as they are similar to the DL condition list DL_1. Note that~~,~~ the unit records UR_1 which are exemplified herein do not show the identifier ID_{CD} of β_2, which means the content reservation status data D_{RS} does not include any DL condition list L_{DL} for the content data CD_B.

~~[0027]~~ Such content reservation status data D_{RS} is forwarded from the processing unit 61 to the circuit interface 62 so as to be converted into a format which is suitable for the first communications circuit 4. Then, the format-converted data D_{RS} is sent out onto the first communications circuit 4. The ~~Here, the~~ circuit interface 62 corresponds to a data transmission part

herein~~in claims~~. The content reservation status data D_{RS} is received by the circuit interface 33 of the DCE 3 after going through several exchange systems 41 in the first communications circuit 4. By the circuit interface 33, the content reservation status data D_{RS} is converted back (reconverted) into its original format ~~(reconverted)~~ before being forwarded to the user interface 32 via the processing unit 31. Then, the user interface 32 converts the ~~thus~~ received content reservation status data D_{RS}~~,~~ before being sent ~~sending~~ out onto the transmission path 2~~,~~ into a format that is suited therefor. The content reservation status data D_{RS} is then received by the DTE 1 (sequence SQ1).

~~[0028]~~ In response to the content reservation status data D_{RS}, the DTE 1 generates a request (step ST2). Specifically, the DTE 1 reconverts the received content reservation status data D_{RS} into its original format, and then displays each of the DL condition list L_{DL}, and the like, on the screen of the DTE 1 ~~thereof~~ with the output processing having been executed (see FIG. 12). Thereby, the user can search for any DL condition list L_{DL} whose time limit LT and transmission expense TC meet his/her needs while referring to the reservation status of each content data CD. If the user finds ~~found~~ any suitable DL condition list L_{DL}, the user designates the DL condition number N_{DL} thereof. In response, the DTE 1 generates a ~~such~~ content reservation request RS_{TR} such as the one ~~as~~ shown in FIG. 13a. In FIG. 13a, the content reservation request RS_{TR} is a signal which indicates that the user wants any specific

content data CD to be transmitted for downloading, and includes at least an identifier ID_{TR}, an identifier ID_{SERVER}, an identifier ID_{USER}, and a DL condition number N_{DL}. Here, the identifier ID_{TR} is the identifier which specifies ~~one specifying~~ that the signal is a content reservation request RS_{TR}. The identifier ID_{SERVER} specifies which server 6 is the addressee of the content reservation request RS_{TR}, while the identifier ID_{USER} specifies from where the content reservation request RS_{TR} came (i.e., DTE 1). Here, since the DL condition number N_{DL} is the one that is designated by the user, the server 6 can know which content data CD is requested together with the time limit LT and the transmission expense TC thereof.

~~[0029]~~ In the case when ~~that~~ the user does not find any ~~finds no~~ DL condition list L_{DL} matching his/her needs, the user operates the DTE 1 to designate any specific content data CD and time limit LT. In response, the DTE 1 generates a ~~such~~ content reservation request RS_{TR} such as the one ~~as~~ shown in FIG. 13b. As compared to ~~Compared with~~ the content reservation request RS_{TR} of FIG. 13a, the content reservation request RS_{TR} of FIG. 13b carries the identifier ID_{CD} and the time limit LT instead of the DL condition number N_{DL}.

~~[0030]~~ Such a content reservation request RS_{TR} in the DTE 1 is converted into a format that is suitable ~~suited~~ for the transmission path 2, and is then sent out on the transmission path 2 ~~thereonto~~ to be received by the user interface 32 of the DCE

3 (see FIG. 2). The~~Therein, the~~ content reservation request RS_{TR} is reconverted in the user interface 32 before being forwarded to the circuit interface 33 via the processing unit 31. In the circuit interface 33, the received content reservation request RS_{TR} is converted into a format that is ~~this time~~ suitable for the first communications circuit 4, and is then sent out onto the first communications circuit 4~~thereonto~~. The content reservation request RS_{TR} is then received by the circuit interface 62 of the server 6 (see FIG. 3)(sequence SQ2). In the circuit interface 62~~Therein~~, the content reservation request RS_{TR} is reconverted and is forwarded to a memory (not shown) of the processing unit 61.

~~[0031]~~ The processing unit 61 checks the identifier ID_{TR} in the stored data so as to determine ~~know~~ whether the stored data is the content reservation request RS_{TR}. The processing unit 61 also determines whether or not the time limit LT in the content reservation request RS_{TR} is still valid for transmitting the designated content data CD to the DTE 1 (step ST3). Here, refer to FIG. 14 for the detailed processing procedure of step ST3. In FIG. 14, the processing unit 61 of the server 6 sees whether the time limit LT in the content reservation request RS_{TR} has already passed or not (step ST31). If the time limit LT has not yet passed, the processing unit 61 generates a ~~such~~ recording area reserve request RS_{ER} such as the one shown in FIG. 13c (step ST32). In FIG. 13c, the recording area reserve request RS_{ER} is a signal

indicating that a recording area in the content storage 35 of the DCE 3 (see FIG. 2) is requested to be reserved. Here, the recording area reserve request RS_{ER} includes at least an identifier ID_{RER}, an identifier ID_{USER}, and a data size I_{DS}. The identifier ID_{RER} specifies the received signal as a recording area reserve request RS_{ER}. The identifier ID_{USER} indicates which DCE 3 shall reserve a recording area, and the DCE 3 designated here is the same as the DCE 3 that is ~~one~~ set in the content reservation request RS_{TR}. The data size I_{DS} shows the content data CD that is designated by the content reservation request RS_{TR} by size, and is acquired by the processing unit 61 from the content storage 64 by using the identifier ID_{CD}. As for the identifier ID_{CD}, if the content reservation request RS_{TR} is analyzed as being in the format of FIG. 13a, the DL condition number N_{DL} therein is referred to and the corresponding identifier ID_{CD} is extracted from the addressee list L_{DEST} (see FIG. 5). On the other hand, if ~~If~~ the content reservation request RS_{TR} is in the format of FIG. 13b, the identifier ID_{CD} is extracted directly therefrom. With the ~~such~~ acquired identifier ID_{ER}, identifier ID_{USER}~~,~~ and data size I_{DS}, the processing unit 61 generates the recording area reserve request RS_{ER}.

~~[0032]~~ The recording area reserve request RS_{ER} is then forwarded from the processing unit 61 to the circuit interface 62, and is sent out onto a control channel of the first communications circuit 4 (sequence SQ3). Here, the control channel is the one that is provided in advance to control the equipment (e.g., exchange system

41, DCE 3) in the first communications circuit 4. Note that in order ~~,~~ to transmit data that was most recently ~~lastly~~ received by the DTE 1 such as the content reservation status data D_{RS}~~, used is not the control channel but~~ a data channel of the first communications circuit 4 is used instead of the control channel. The recording area reserve request RS_{ER} goes through several exchange systems 41 before being received by any one predetermined exchange system 41. The predetermined exchange system 41 typically is the one that is located closest to the DCE 3.

~~[0033]~~ In response to the recording area reserve request RS_{ER}, the predetermined exchange system 41 generates a recording area reserve instruction IS_{ER} (step ST4). The recording area reserve instruction IS_{ER} is a signal which instructs the DCE 3 to reserve a recording area, and includes at least, as shown in FIG. 13d, an identifier ID_{IER}, an identifier ID_{USER}, and a data size I_{DS}. Here, the identifier ID_{USER} and the data size I_{DS} are the same as those in the presently received recording area reserve request RS_{ER} ~~currently received~~. The identifier ID_{IER} specifies itself as ~~is~~ a recording area reserve instruction IS_{ER}. The ~~Thus~~ generated recording area reserve instruction IS_{ER} goes through the predetermined exchange system 41 to the DCE 3, specifically to the circuit interface 33 (see FIG. 2) via the control channel of the first communications circuit 4 (sequence SQ4). Note that, in step ST4, the predetermined exchange system 41 operates ~~works~~ as a recording area management unit herein~~in claims~~.

~~[0034]~~ With the reconversion processing that is executed on the recording area reserve instruction IS_{ER}, the circuit interface 33 of the DCE 3 forwards the reconverted recording area reserve instruction IS_{ER} ~~that~~ to the processing unit 31. In response thereto, the processing unit 31 has the content storage 35 reserve ~~reserved~~ a recording area that is large enough for the data size I_{DS} that is designated thereby (step ST5). With the recording area successfully reserved, the processing unit 31 generates a positive acknowledgement AS_{RD}. The positive acknowledgement AS_{RD} is a signal indicating that the recording area has been reserved, and, as shown in FIG. 13e, includes at least an identifier ID_{RD} for identifying the received signal as a positive acknowledgement AS_{RD}, an identifier ID_{USER} for specifying from where the positive acknowledgement AS_{RD} came, and an identifier ID_{SERVER} specifying an addressee thereof (i.e., the server 6). Such a positive acknowledgement AS_{RD} is sent out onto the control channel of the first communications circuit 4 via the circuit interface 33. Then, the positive acknowledgement AS_{RD} is received by the circuit interface 62 of the server 6 (see FIG. 3) via the first communications circuit 4 (sequence SQ5).

~~[0035]~~ With the reconversion processing that is executed on the positive acknowledgement AS_{RD}, the circuit interface 62 forwards the positive acknowledgement AS_{RD} ~~that~~ to the processing unit 61. In response thereto, the processing unit 61 generates a reception completion notice AS_{RR} (step ST6). The reception

completion notice AS_{RR} is a signal notifying the DTE 1 that the content reservation request RS_{TR} has been successfully received, and, as shown in FIG. 13f, includes at least an identifier ID_{RR}, an identifier ID_{USER}, and an identifier ID_{SERVER}. The identifier ID_{RR} specifies the received signal as a reception completion notice AS_{RR}. The identifier ID_{USER} specifies which DTE 1 is to receive the reception completion notice AS_{RR}, while the identifier ID_{SERVER} specifies from which server ~~serer~~ 6 the reception completion notice AS_{RR} came. The ~~Such~~ reception completion notice AS_{RR} is also subjected to the conversion processing by the circuit interface 62 as is the content reservation status data D_{RS}, and is then ~~is~~ sent out onto the first communications circuit 4 (sequence SQ6). Then, the reception completion notice AS_{RR} is processed in the same manner as the content reservation status data D_{RS} by the DCE 3, is transmitted over the transmission path 2, and is then received by the DTE 1.

~~[0036]~~ In response to the reception completion notice AS_{RR}, the DTE 1 carries out reception completion output processing (step ST7). In detail, the DTE 1 shows the user, on its ~~the~~ screen, a message indicating ~~telling~~ that the content reservation request RS_{TR} that was transmitted in step ST2 has been normally processed in steps ST3 and ST6 by the server 6.

~~[0037]~~ If the processing in steps ST3 and ST6 is not normally completed for some reason ~~reasons~~, although not shown in FIG. 9, the processing unit 61 generates a failure notice if it is determined,

in step ST31, that the time limit LT of the content reservation request RS_{TR} has already passed (FIG. 14; step ST33). The processing unit 61 generates the failure notice also responding to a negative acknowledgement from the DCE 3. The negative acknowledgement is generated if a reservation for the recording area was not successful~~did not work out~~, and the negative acknowledgment is transmitted to the server 6 in the same manner as the positive acknowledgement AS_{RD}. The ~~Thus~~ generated failure notice goes through, as the reception completion notice AS_{RR}, the first communications circuit 4, the DCE 3, and the transmission path 2, and is then ~~is~~ received by the DTE 1. Upon ~~On~~ reception of the failure notice, the DTE 1 shows the user, on its ~~the~~ screen, a message indicating ~~telling~~ that the currently transmitted content reservation request RS_{TR} has failed to be normally processed in steps ST3 and ST6 by the server 6.

~~[0038]~~ As ~~Note that, in the above as~~ for the above-described sequences SQ1 to SQ6, note that each ~~every~~ downlink signal, which are the content reservation status data D_{RS}, the recording area reserve request RS_{ER}, the recording area reserve instruction IS_{ER}, and the reception completion notice AS_{RR}, is transmitted over the first communications circuit 4. The first embodiment, however, ~~This~~ is not restricted thereto, ~~restrictive~~ and it is also possible to transmit each downlink signal over the second communications circuit 5 instead~~is also a possibility~~, but the first communications circuit 4 is still preferable here as the ~~those~~

downlink signals are not multicast.

~~[0039]~~ With step ST7 completed, ~~referred to next is~~ FIG. 10 is now referred to for its sequence chart. In FIG. 10, the processing unit 61 carries out request acceptance processing (step ST8). Step ~~This step~~ ST8 corresponds to an acceptance processing part herein~~in claims~~, and FIG. 15 shows the detailed processing procedure thereof. In FIG. 15, the processing unit 61 of the server 6 first determines whether the currently received content reservation request RS_{TR} carries any DL condition number N_{DL} (step ST81). If the currently received content reservation request RS_{TR} carries a DL condition number N_{DL} (see FIG. 13a), the processing unit 61 extracts, from the addressee list L_{DEST}, any unit record UR_1 corresponding to the DL condition number N_{DL} on the memory thereof (step ST82). Then, the processing unit 61 extracts the identifier ID_{USER} from the content reservation request RS_{TR}, adds the ~~thus~~ extracted identifier ID_{USER} to the unit record UR_1 on the memory, and then counts the total number of the identifiers ~~identifier~~ ID_{USER} therein (that is, the number of users N_{USER} that are requesting ~~for~~ the same content data CD)(step ST83).

~~[0040]~~ Then, the processing unit 61 extracts, from the transmission expense list L_{TC} (see FIG. 7), the transmission expense TC corresponding to the counted number of users N_{USER} (step ST84). Here, to avoid confusion, the transmission expense TC which is found in the unit record UR_1 and which is retrieved in step ST82 is now referred to as a current transmission expense TC, while

the transmission expense TC which is found in the transmission expense list L_{TC} in step ST84 is referred to as a new transmission expense TC.

~~[0041]~~ The processing unit 61 then compares the new transmission expense TC with the current transmission expense TC to see which is more expensive (step ST85). If the current transmission expense TC is equal to or cheaper than the new transmission expense TC, the procedure skips step ST86 and goes to step ST87~~;~~ otherwise the procedure goes through step ST86. That is, if the new transmission expense TC is cheaper than the current transmission expense TC, the processing unit 61 considers the new transmission expense to be ~~it~~ good for the user and thus overwrites~~, with the new transmission expense TC,~~ the current transmission expense TC of the unit record UR_1 on the memory (step ST86) with the new transmission expense TC. Then, the procedure goes to step ST87. In step ST87, the processing unit 61 stores the unit record UR_1 on the memory in the addressee list storage 65 so as to update the addressee list L_{DEST} therein. After step ST87 is completed~~through~~, the processing unit 61 ends the processing of FIG. 15.

~~[0042]~~ Hereinafter, the update processing (steps ST82 to ST86) that is executed on the unit record UR_1 is specifically described. Assume now that ~~now~~ is the time to start the processing in step ST81, and a currently received content reservation request RS_{TR} ~~currently received~~ shows 1 for the DL condition number N_{DL} and

α_1 for the identifier ID_{USER}. Further, extracted in step ST82 ~~is presumably~~ the unit record UR_{11} shown in FIG. 5 is presumably extracted in step ST82. In such a case, after step ST83, the unit record UR_{11} will include α_1 in the identifier ID_{USER} as shown in FIG. 16a, and the number of identifier ID_{USER} becomes 500 in total. Therefore, according to the transmission expense list L_{TC} of FIG. 7, the transmission expense TC of ¥400 is extracted in step ST84. Accordingly ~~As such~~, after step ST86, as shown in FIG. 16b, the unit record UR_{11} shows ¥400 for the transmission expense TC.

~~[0043]~~ As another example, the number of identifier ID_{USER} and the transmission expense TC in the unit record UR_{11} is presumably 10 and ¥550 when step ST81 is started, but the rest remains the same as in the above example. In this case, the new transmission expense TC (¥550) shows no change from the current transmission expense TC (¥550). Only a difference herein is α_1 added in the unit record UR_{11}.

As is known from the above, in the request acceptance processing, the more users that request for data transmission under the same conditions (e.g., time limit LT, content data CD), the cheaper the transmission expense TC becomes.

~~[0044]~~ In step ST81 of FIG. 15, if the content reservation request RS_{TR} does not carry a ~~carries no~~ DL condition number N_{DL} (see FIG. 13b), the processing unit 61 generates a new unit record UR_1. For this purpose, the processing unit 61 assigns a unique DL condition number N_{DL} to the to-be-generated new unit record

UR_1, and then extracts identifier ID_{CD}, identifier ID_{USER}, and a time limit LT from the content reservation request RS_{TR} (step ST88). The processing unit 61 then calculates a difference, i.e., a time margin TM, between the time limit LT and the current time. Then, the processing unit 61 refers to the initial transmission expense list L_{TC} (FIG. 8) to see which transmission initial expense ITC therein corresponds to the calculated time margin TM (step ST89). The ~~Thus~~ found transmission initial expense ITC is extracted and is then written into the to-be-generated unit record UR_1. With the ~~such~~ extracted information including the DL condition number N_{DL}, the identifier ID_{CD}, the time limit LT, the transmission expense TC, and the identifier ID_{USER}, a new unit record UR_1 is generated (step ST810). Then, the processing unit 61 stores the ~~thus~~ generated unit record UR_1 in the addressee list storage 65 so as to update the addressee list L_{DEST} therein (step ST811). After step ST87 is completed~~through~~, the processing unit 61 ends the processing of FIG. 15.

~~[0045]~~ Hereinafter, the ~~such~~ processing of adding a new unit record UR_1 (steps ST88 to ST811) is specifically described. Assume now that ~~now~~ is the time to start the processing in step ST81, and that the addressee list L_{DEST} that is referred to is the one in FIG. 5. Also, the currently received content reservation request RS_{TR} ~~currently received~~ presumably shows β_1 for the identifier ID_{CD}, α_1 for the identifier ID_{USER}, 20:00 on February 15 for the time limit LT, and the current time is 20:00 on February

14. In this case, a time margin TM is 24 hours, and ~~accordingly~~ a transmission initial expense ITC to be retrieved in step ST89 is accordingly ¥480. Therefore, after step ST811 is completed~~through~~, the addressee list L_{DEST} additionally includes the ~~such~~ new unit record UR_{14} such as the one as shown in FIG. 16c.

~~[0046]~~ As is known from the above, in the processing of adding a new unit record, the longer the time margin TM is before the time limit LT in the content reservation request RS_{TR}, the ~~cheaper the~~ transmission initial expense ITC will be ~~is~~ set to be cheaper. It is to be understood that the longer time margin TM leads the server 6 to accept ~~the~~ more content reservation requests RS_{TR} requesting for the transmission of the same content data CD under the same conditions.

~~[0047]~~ As shown in FIG. 10, the processing unit 61 of the server 6 carries out scheduling so as to determine a timing for transmitting the content data CD (step ST9). Although such scheduling is presumed here to be carried out only after the addressee list L_{DEST} is updated in step ST8, the first embodiment ~~this~~ is not restricted thereto, ~~restrictive~~ and the scheduling may also be carried out within ~~also with~~ a predetermined interval. Step ~~This step~~ ST9 corresponds to a scheduling part herein~~in claims~~, and FIG. 17 shows the detailed processing procedure thereof. In FIG. 17, the processing unit 61 searches the addressee list L_{DEST} (see FIG. 5) for unit records UR_1 satisfying a first condition of "time limit

LT - current time < reference time RT" (step ST91). Here, the reference time RT is a predetermined time allowance plus a time which ensures that the data transmission from the server 6 to the DCE 3 is completed by the time limit LT, and the reference time RT is set in advance with consideration of ~~for~~ parameters that are typified by the transmission bandwidth of the first and second communications circuits 4 and 5. Hereinafter, unit records UR_1 satisfying the first condition are ~~is~~ referred to as a first group.

~~[0048]~~ For each ~~every~~ unit record UR_1 that is included in the first group, the processing unit 61 then determines which communications circuit 4 or 5 is to be used for data transmission (step ST92). See FIG. 18 for the detailed processing procedure thereof. In FIG. 18, the processing unit 61 selects one target unit record UR_1 from the first group (step ST921). Then, the processing unit 61 determines whether the number of users N_{USER} in the selected target unit record UR_1 exceeds a reference value V_{REF1} (step ST922). The reference value V_{REF1} is a threshold for the number of users requesting for ~~downloading~~ the content data CD to be downloaded under the conditions in the unit record UR_1, and the reference value V_{REF1} is set in advance with consideration of ~~for~~ parameters regarding the first and second communications circuits 4 and 5 in terms of their respective transmission bandwidths~~bandwidth~~.

~~[0049]~~ As described above, the second communications circuit 5 (satellite circuit) is suited for multicasting, and when the

number of users is quite large for data transmission, the second communications circuit 5 is a better selection in view of the transmission expense. Therefore, when the number of users N_{USER} exceeds the reference value V_{REF1}, the processing unit 61 determines ~~finds~~ that the second communication circuit 5 is suitable for the transmission of the content data CD that is designated by the target unit record UR_1. For example, assuming that the reference value V_{REF1} is now 499, as exemplified in FIG. 19a, the processing unit 61 sets 0 to the communications circuit flag F_{CIR} in the unit record UR_1 (step ST923).

~~[0050]~~ On the other hand, when the number of users N_{USER} does not exceed the reference value V_{REF1} in step ST922, the processing unit 61 then uses a reference value V_{REF2} to compare with the number of users N_{USER} (step ST924). The reference value V_{REF2} is also a threshold, and is set to be, at least, smaller than the reference value V_{REF1}.

~~[0051]~~ As already described, the first communications circuit 4 (public circuit) is not suited for multicasting, but is better for transmitting the same data to the fewer DTEs 1 (i.e., users) in view of the transmission expense per bit. Therefore, when the number of users N_{USER} does not exceed the reference value V_{REF2}, the processing unit 61 determines ~~finds~~ that the first communication circuit 4 is suitable for the transmission of the content data CD that is designated by the target unit record UR_1. Then, as exemplified in FIG. 19b, the processing unit 61 sets 1

to the communications circuit flag F_{CIR} in the target unit record UR_1 (step ST925).

~~[0052]~~ In the case where ~~that~~ the number of users N_{USER} exceeds the reference value V_{REF2} in step ST924, the processing unit 61 then uses a reference size V_{REF3} to compare with the data size I_{DS} of the content data CD that is retrieved from the content storage 64 (step ST926). The reference size V_{REF3} is a threshold for the size of the content data CD to be transmitted under the conditions in the target unit record UR_1, and is set in advance with consideration of ~~for~~ parameters that are typified by the respective transmission bandwidths ~~bandwidth~~ of the first and second communications circuits 4 and 5.

~~[0053]~~ Here, the first communications circuit 4 has a wider bandwidth for data transmission than the transmission bandwidth ~~that~~ of the second communications circuit 5. Accordingly, even when the number of users N_{USER} exceeds the reference value V_{REF2}, if the processing unit 61 determines that ~~as~~ the data size I_{DS} exceeds ~~exceeding~~ the reference size V_{REF3} in step ST926, step ST925 is carried out. Otherwise, the procedure goes to step ST923.

~~[0054]~~ After either step ST923 or ST925 is completed~~through~~, that is, after the communications circuit flag F_{CIR} is set, the processing unit 61 determines if any unit record UR_1 is left yet unselected (step ST927). If any unit record UR_1 is determined to be unselected~~yes~~, the procedure repeats step ST921 and onward until no unit record UR_1 is left unselected. On the other hand, if no

~~If~~ determined no, ~~on the other hand,~~ this is the end of the processing of FIG. 18.

~~[0055]~~ With the processing of FIG. 18 being carried out, either the communications circuit 4 or 5 is applied to every unit record UR_1 in the first group. However, as already described, the second communications circuit 5 (satellite circuit) will soon be short of transmission bandwidth if the content data CD that is designated by a number of ~~many~~ unit records UR_1 is transmitted thereover. Therefore, if the number of unit records UR_1 that are assigned 0 in the communications circuit flag F_{CIR} becomes large in step ST92, the server 6 is placed in a wait state for transmitting the content data CDs of some unit records UR_1, thereby possibly causing those not to be ready in the DCE 3 by their own time limits LT. In order to avoid this, after step ST92 is completed~~through~~, the processing unit 61 determines, for every content data CD that is designated by each of the unit records UR_1 in the first group, whether the transmission of each designated content data CD ~~thereof~~ can be completed by their own time limits LT (step ST93). In detail, the determination is made, for the unit record UR_1 that is assigned 1 in the communications circuit flag F_{CIR}, by comparing its time limit LT with a transmission completion time. Here, the transmission completion time from the current time is approximately calculated from the transmission bandwidth of the first communications circuit 4 and the size I_{DS} of the content data CD. For the unit record UR_1 that is assigned 0 in the communications

circuit flag F_{CIR}, the same manner as described above is applicable, but the transmission bandwidth that is used for calculation of the transmission completion time is of the second communications circuit 5. With such processing being executed, if the processing unit 61 determines that every content data CD in the first group is ~~as~~ transmittable by ~~their~~ each of their time limits ~~limit~~ LT, the processing of FIG. 17 is ended.

~~[0056]~~ On the other hand, if the processing unit 61 determines that the content data CD that is designated by at least one unit record UR_1 as being nontransmittable by ~~the~~ each respective time limit LT, ~~calculated is~~ a communications validity V_{CR} is calculated for every unit record UR_1 (step ST94). Hereinafter, any unit record UR_1 whose content data CD is determined as being nontransmittable by the time limit LT in step ST93 is referred to as a nontransmittable unit record UR_1. The communications validity V_{CR} is an indicator that is used to verify the reliability of the communications circuit that is selected in step ST92. Here, as the communication validities V_{CR} are ~~is~~ calculated differently for the first and second communications circuit 4 and 5, the communications validity V_{CR} for the first communications circuit 4 is referred to as a communications validity V_{CR1}, while the communications validity V_{CR} ~~that~~ for the second communications circuit 5 is referred to as a communications validity V_{CR2}. For the unit record UR_1 that is assigned 1 in the communications circuit flag F_{CIR}, the communications validity V_{CR1} becomes higher as ~~the fewer~~ the number

of users N_{USER} in the identifier ID_{USER} becomes fewer, ~~the larger~~ the size I_{DS} of the content data CD becomes larger, and ~~the longer~~ the time margin TM becomes longer. Conversely, for ~~For~~ the unit record UR_1 that is assigned 0 in the communications circuit flag F_{CIR}, ~~conversely,~~ the communications validity V_{CR2} becomes higher as the ~~more the~~ number of users N_{USER} in the identifier ID_{USER} increases, ~~the smaller~~ the size I_{DS} of the content data CD becomes smaller, and the ~~shorter the~~ time margin TM becomes shorter.

~~[0057]~~ After step ST94 is completed~~through~~, the processing unit 61 searches the nontransmittable unit record(s) UR_1 so as to find a reference unit record UR_1 showing the closest time limit TM to the current time (step ST95). Then, the processing unit 61 selects a potential unit record UR_1 from among those unit records UR_1 in the first group except for the nontransmittable unit record(s) UR_1. Here, the potential unit record UR_1 is the one satisfying a second condition of having the closer time margin TM to the current time and the ~~lower~~ communications validity V_{CR} which is lower than the reference unit record UR_1, and being assigned the same communications circuit flag F_{CIR} as the reference unit record UR_1 (step ST96).

~~[0058]~~ The processing unit 61 then transmits the content data CD that is specified by the potential unit record UR_1 over the communications circuit that is different from the communications circuit ~~one~~ currently assigned thereto, and determines ~~sees~~ if the content data CD that is specified by the reference unit record

UR_1 is transmittable by the time limit LT (step ST97). Here, the processing of step ST97 is described in detail. As for the content data CD that is specified by the potential unit record UR_1, a transmission time from the server 6 to the DCE 3 can be calculated from its data size I_{DS} and the transmission bandwidth of the communications circuit depending on which of the communication circuits has been applied thereto. In the same manner as described above in step ST93, a transmission completion time ET of the reference unit record UR_1, which shows the time in which ~~by when~~ the specified content data CD ~~specified thereby~~ reaches the DCE 3, can be calculated based on the current time. If the transmission time that is calculated for the potential unit record UR_1 is deducted from the ~~thus~~ calculated transmission completion time ET of the reference unit record UR_1, ~~approximated is~~ a new transmission completion time ET is approximated for the case where ~~that~~ the content data CD that is specified by the potential unit record UR_1 is transmitted over the communications circuit that is different from the communications circuit ~~one~~ currently applied thereto. If the ~~thus~~ approximated new transmission completion time ET comes earlier than the time limit LT of the reference unit record UR_1, the processing unit 61 determines the time limit LT of the reference unit record UR_1 as assurable, and thus changes, in value, the communications circuit flag F_{CIR} of the potential unit record UR_1 (step ST98). Conversely, if the new transmission completion time is not earlier than the time limit LT of the reference unit record

UR_1, the processing unit 61 changes, in value, the communications circuit flag F_{CIR} of the reference unit record UR_1 (step ST99). After step ST98 or ST99 is completed~~through~~, the procedure returns to step ST93 and repeats the above-described ~~above~~ processing.

~~[0059]~~ Described next, schematically, is the processing of steps ST94 to ST99 with reference to FIGS. 20a and 20b. In this example, it is assumed that determination made in step ST93 is NO, and five ~~5~~ unit records UR_{1i}, UR_{1j}, UR_{1k}, UR_{1l}, and UR_{1m} have the same communications circuit flag F_{CIR} but vary in time limit LT from LT_i to LT_m as shown by the time axis t of FIG. 20a. On the time axis t, content data CDs that are specified by the unit records UR_{1i} to UR_{1m}, respectively, are also indicated by the transmission completion times ET_i to ET_m. In this case, as is known from the transmission completion times ET_k and ET_l which are after ~~located later than~~ the time limits LT_k and LT_l, the unit records UR_{1k} and UR_{1l} are selected as the nontransmittable unit record UR_1. In FIG. 20a, the unit records UR_{1i} to UR_{1m} are also indicated ~~also~~ by the communications validity V_{CR1} to V_{CRm}, respectively.

~~[0060]~~ In this example, the unit record UR_{1k} is selected as the reference unit record UR_1 in step ST95, ~~is the unit record UR_{1k}~~ and the unit record UR_{1j} is selected as the potential unit record UR_1 in step ST96. ~~is the unit record UR_{1j}.~~ Then, in step ST97, the content data CD of the unit record UR_{1j} is transmitted over the communications circuit that is different from the communications circuit that is ~~one~~ assigned thereto so as to

determine ~~see~~ whether the time limit LT_k of the reference unit record UR_{1k} is assurable. If the time limit LT_k of the reference unit record UR_{1k} is determined to be ~~as~~ assurable in step ST98, as shown in FIG. 20b, the communications circuit flag F_{CIR} of the unit record UR_{1j} is changed in value so that the unit record UR_{1j} will be sent ~~for sending~~ out onto the other communications circuit.

~~[0061]~~ Refer to FIG. 10 again. The processing unit 61 carries out data send-out and charge processing so as to transmit the content data CD to the user and charge therefor (step ST10). Although the data send-out and charge processing is presumed here to be carried out after scheduling (step ST9), the first embodiment ~~this~~ is not restricted thereto, ~~restrictive~~ and step ST10 may be carried out also within ~~with~~ a predetermined interval. Step ~~This step~~ ST10 corresponds to a data send out part herein~~in claims~~, and FIG. 21 shows the detailed processing procedure thereof. In FIG. 21, the processing unit 61 first refers to the addressee list L_{DEST} so as to select any one unit record UR_1 to which the communications circuit flag F_{CIR} is set and its time limit LT is closest to the current time (hereinafter, referred to as transmission target unit record UR_1) (step ST101). Then, the processing unit 61 retrieves, from the content storage 64, any content data CD having the same identifier ID_{CD} as in the transmission target unit record UR_1 (step ST102). The processing unit 61 also extracts the identifier ID_{USER} from the transmission target unit record UR_1 (step ST103).

~~[0062]~~ The processing unit 61 then generates ~~such~~ transmission

data TD such as the one ~~as~~ shown in FIG. 13g (step ST104). In FIG. 13g, the transmission data TD includes an identifier ID_{TD}, an identifier ID_{CD}, an identifier ID_{USER}, an identifier ID_{SERVER}, and a content data CD. Here, the identifier ID_{TD} specifies the received signal as being the transmission data TD. The identifier ID_{CD} and the identifier ID_{USER} are the identifiers which are ~~ones~~ set in the transmission target unit record UR_1. The identifier ID_{SERVER} specifies from which server 6 the transmission data TD came. The content data CD is the one that is retrieved in step ST102.

~~[0063]~~ After step ST104 is completed~~through~~, the processing unit 61 checks the communications circuit flag F_{CIR} in the transmission target unit record UR_1 for its value (step ST105). If the communications circuit flag F_{CIR} shows 1, the processing unit 61 forwards the transmission data TD that is generated in step ST104 to the circuit interface 62 (see FIG. 3). In response, the circuit interface 62 converts the ~~thus~~ received transmission data TD into a format which is suitable ~~suited~~ for the first communications circuit 4 before sending out the received transmission data TD onto the first communications circuit 4 ~~thereonto~~ as shown by sequence SQ7 of FIG. 11 (step ST106).

~~[0064]~~ On the other hand, if the communications circuit flag F_{CIR} shows 0 in step ST105, the transmission data TD is forwarded to the transmission unit 63 of the server 6. In the transmission unit 63~~Therein~~, the transmission data TD is then subjected to the conversion processing before being sent out onto the second

communications circuit 5 (step ST107). For the sake of convenience, such transmission data TD that is not sent out onto the second communications circuit 5 is not shown.

~~[0065]~~ After step ST106 or ST107 is completed~~through~~, the processing unit 61 carries out charge processing. In detail, the processing unit 61 makes an access to the charge list storage 66 (see FIG. 6) so as to extract, from the charge list L_{PAY} therein, the charge information I_{PAY} each corresponding to the identifier ID_{USER} that is set in the transmission target unit record UR_1 (step ST108). Then, the processing unit 61 adds, to each of the ~~thus~~ retrieved charge information I_{PAY}, the transmission expense TC that is found in the transmission target unit record UR_1 (step ST109) so that the charge information I_{PAY} is updated. The processing unit 61 then makes ~~an~~ another access to the charge list storage 66 so as to register the ~~thus~~ updated charge information I_{PAY} and the corresponding identifier ID_{USER} in the charge list L_{PAY} (step ST110). In this manner, the user is charged for the currently-received content data CD according to ~~at~~ the amount that is written in the transmission expense TC.

~~[0066]~~ After step ST1010 is completed~~through~~, the processing unit 61 deletes the current transmission target unit record UR_1 from the addressee list L_{DEST} (step ST1011), and then determines ~~sees~~ if any unit record UR_1 is left unselected as the transmission target unit record UR_1 (step ST1012). If any unit record UR_1 is left unselected, the procedure returns to step ST101 so as to repeat

the above-described ~~above~~ processing. If no unit records UR_1 are left unselected~~none~~, this is the end of this step ST10.

~~[0067]~~ After sending out the transmission data TD onto the first communications circuit 4 in step ST106, the ~~such~~ transmission data TD goes through several exchange systems 41 before being received by the circuit interface 33 of the DCE 3. The circuit interface 33 reconverts the transmission data TD before forwarding the transmission data TD ~~that~~ to the processing unit 31. In response, the processing unit 31 carries out data storage processing (step ST11). FIG. 22 shows the detailed processing procedure thereof. In FIG. 22, the processing unit 31 stores at least the identifier ID_{CD} and the content data CD of the received transmission data TD into a predetermined recording area in the content storage 35 (step ST111). Here, the predetermined recording area is the recording area that is ~~one~~ reserved in step ST5.

~~[0068]~~ Next, the processing unit 31 generates a storage completion notice AS_{CD} (step ST112), which is data indicating that the content data CD that is requested by the content reservation request RS_{TR} has been stored. Typically, the storage completion notice AS_{CD} is data in the HTML (Hyper Text Markup Language) format or an e-mail. Note that in order ~~,~~ to generate data in the HTML format, the DCE 3 needs to function as a WWW server, and to generate an e-mail, the DCE 3 needs to function as a mail server. In the case where ~~that~~ the DCE 3 functions both as the WWW server and the mail server, the DCE 3 needs to be set in advance, by the user's

operation or by default, in which format such a to-be-generated storage completion notice AS_{CD} is to be transmitted.

~~[0069]~~ After step ST112, the processing unit 31 checks whether the DTE 1 is ON (step ST113), and if the DTE 1 is ON, the processing unit 31 forwards the generated storage completion notice AS_{CD} to the user interface 32. The user interface 32 then converts the storage completion notice AS_{CD} into a format which is suitable ~~suited~~ for the transmission path 2 before sending out the storage completion notice AS_{CD} onto the transmission path 2 ~~thereonto~~ (step ST114). The storage completion notice AS_{CD} is the ~~thus~~ received by the DTE 1 (sequence SQ8).

~~[0070]~~ It should be noted that, if step ST107 is carried out, the transmission data TD is transmitted over the second communications circuit 5. In detail, the server 6 notifies a predetermined multicast address to the DCE 3_T which is to receive the current transmission data TD. Then, the server 6 generates the transmission data TD having the multicast address set as the identifier ID_{USER} therein (see FIG. 13g). Such transmission data TD goes through, from the transmission unit 63 of the server 6, the transmission antenna 51, the artificial satellite 52, and the reception antenna 53, and is then received by the reception unit 34 of the DCE 3, which has been notified of the multicast address in advance. If this is the case, the reception unit 34 is the one which subjects the transmission data TD to the reconversion processing ~~to the transmission data TD~~ before forwarding the

transmission data TD ~~that~~ to the processing unit 31. Then, responding to the transmission data TD, the processing unit 31 carries out the data storage processing in the same manner as described above but only if the transmission data TD carries the notified multicast address. If the transmission data TD carries some other identifier ID_{USER}, the processing unit 31 needs to discard the transmission data TD. This is because~~, once sent out onto the second communications circuit 5,~~ the transmission data TD reaches every DCE 3 in the data transmission system once the transmission data TD is sent out onto the second communications circuit 5.

~~[0071]~~ Upon ~~On~~ reception of the storage completion notice AS_{CD}, the DTE 1 shows the user a message indicating ~~telling~~ that the content data CD at his/her request has been stored (step ST12). The user thus knows that the requested content data CD has ~~having~~ reached the DCE 3. The user operates the DTE 1, whenever convenient, so as to designate the content data CD that is stored in the DCE 3. In response, the DTE 1 generates a read request RS_{RO} (step ST13), which is a signal that ~~which~~ requests the DCE 3 to read the user designated content data CD from the content storage 35.

~~[0072]~~ The read request RS_{RO} is converted by the DTE 1 into a format which is suitable ~~suited~~ for the transmission path 2, sent out onto the transmission path 2~~thereonto~~, received by the user interface 32 of the DCE 3 (see FIG. 2), reconverted in the user interface 32~~therein~~, and is then forwarded to the processing

unit 31 (sequence SQ9). Upon ~~On~~ reception of the read request RD_{RO}, the processing unit 31 reads the currently designated content data CD from the content storage 35 and forwards the currently designated content data CD ~~that~~ to the user interface 32. The content data CD is converted in the user interface 32 ~~therein~~ and is sent out onto the transmission path 2, and thus is received by the DTE 1 (step ST14) (sequence SQ10). The DTE 1 reconverts the content data CD, and then carries out the output processing thereon so as to present the user with what the content data CD carries (step ST15).

~~[0073]~~ Here, in step ST113 of FIG. 22, if the processing unit 31 determines that the DTE 1 is ~~as~~ OFF, the storage completion notice AS_{CD} is retained in the processing unit 31 ~~therein~~ until the DTE 1 is turned ON (step ST115). Once ~~detected~~ the DTE 1 is detected to be ~~was~~ turned ON, the processing unit 31 forwards the retained storage completion notice AS_{CD} to the user interface 32 and then to the DTE 1 via the transmission path 2. Thereafter, the processing of steps ST12 to ST15 is carried out between the DTE 1 and the DCE 3.

~~[0074]~~ As described in the foregoing, in the data transmission system of the first embodiment, the server 6 can selectively send out transmission data TD onto the communications circuits 4 and 5 in consideration of their respective suitability for multicasting. Accordingly, when many users are requesting that ~~for~~ the same content data CD be transmitted, the server 6 basically selects

the second communications circuit 5, which is suited for multicasting. Thus, the data transmission can be done with a cheaper ~~less~~ transmission expense, which is good for users. Therefore~~As such~~, according to the first embodiment, the present data transmission system is more advantageous~~,~~ in view of cost performance to the conventional data transmission system.

~~[0075]~~ By the way, Japanese Patent Laid-Open Publication NO. 10-41976 (98-41976) discloses a method for selecting one communications circuit from among those communication circuits connecting several terminals depending on the size of transmitting data. Here, if this method is combined with the data transmission system of Japanese Patent Laid-Open Publication No. 8-140081 (96-140081) referred to in the description of the Prior Art above (hereinafter, referred to as a conventional data transmission system), a dispute may arise about the difference from the data transmission system of the first embodiment. With such a combination, however, an efficient use of the communications circuits cannot be achieved unlike the data transmission system of the first embodiment. This is because, with the combination, ~~first determined is~~ a time when to transmit the data is first determined, and then ~~followed is~~ which communications circuit is to be used ~~use therefor~~ therefore is determined. Under such control of this combination, however, no consideration is given to suitability of the communications circuits. Thus, it may happen that first data which is not so popular among users is transmitted

over a communications circuit which is suitable for multicasting, and in the meantime, even if second data which is quite popular needs to be transmitted, the communications circuit is not available for the transmission of the second data~~therefor~~. As a result, the second data has to be transmitted over another communications circuit which is not suitable ~~suited~~ for multicasting.

~~[0076]~~ On the other hand, in order to determine a time when to transmit transmission data TD and which communications circuit to use for the transmission of the transmission data TD~~therefor~~, the data transmission system of the first embodiment carries out scheduling (step ST9; specifically, steps ST921 to ST926) while referring to a time limit LT and communications information (e.g., the state of the communications circuits 4 and 5, the number of users N_{USER}, and the data size I_{DS}) of every unit record UR_1 satisfying the first condition. Further, to avoid such a problem as in the above-described ~~above~~ combination, the ~~present~~ data transmission system of the first embodiment uses a communications validity V_{CR} to verify the reliability of the selected communications circuit (see steps ST94 to ST99). In this manner, the ~~present~~ data transmission system of the first embodiment achieves an efficient use of the communications circuits 4 and 5~~,~~ that is, the data transmission system of the first embodiment controls communications traffic, while ensuring the user designated time limit LT.

~~[0077]~~ Further, according to the first embodiment, the server 6 uses content reservation status data D_{RS} to show the user what are the conditions for downloading his/her requested ~~requesting~~ content data CD and how many other users are so far requesting the same content data CD. The content reservation status data D_{RS} is also utilized for inducing other ~~some more~~ users by showing what content data CD is available under what conditions. Once the user finds ~~found~~ any condition matching his/her needs, the DTE 1 generates and transmits a content reservation request RS_{TR} including a DL condition number N_{DL} corresponding to the conditions. Upon ~~On~~ reception of the transmitted content reservation request RS_{TR}~~thereof~~, the server 6 updates the corresponding unit record UR_1 so that the transmission expense TC of the content data CD is accordingly reduced. Therefore~~As such~~, the user can acquire the content data CD with less expense if her/his request is transmitted together with some other users' resquests.

~~[0078]~~ Even if the user does not find ~~finds no~~ conditions matching his/her needs, the user can designate his/her own conditions. In this case, the later his/her designated time limit LT shows, the cheaper his/her expense for the content data CD becomes.

~~[0079]~~ Note that, in the first embodiment, the conditions for downloading the content data CD is exemplified by the time limit LT. The first embodiment, however, ~~This~~ is not restricted thereto~~restrictive~~, and the transmission expense TC and the number

of users N_{USER} may be also included. With the transmission expense TC, the procedure goes to step ST92 when the transmission expense TC in every unit record UR_1 satisfying the first condition becomes a predetermined value or lower in step ST91 in the scheduling processing of FIG. 17. On the other hand, with ~~With~~ the number of users N_{USER}, ~~on the other hand,~~ the procedure goes to step ST92 when the number of users N_{USER} in every unit record UR_1 satisfying the first condition becomes a predetermined value or more in step ST91.

~~[0080]~~ Further, in the first embodiment, when the incoming content reservation request RS_{TR} is in such form as the one illustrated in FIG. 13b, the procedure goes through steps ST88 to ST811 of FIG. 15, and the processing unit 61 thus generates a new unit record UR_1 to be added ~~for addition~~ to the addressee list L_{DEST}. However, if the addressee list L_{DEST} already carries any unit record UR_1 which satisfies a third condition, this is not restrictive. Here, the unit record UR_1 satisfying the third condition is the unit record UR_1 ~~one~~ having the earlier time limit LT and the cheaper transmission expense TC than the new unit record UR_1, and showing the same content data CD as the new unit record UR_1. If such a unit record UR_1 is found in the addressee list L_{DEST}, the identifier ID_{USER} of the new unit record UR_1 is written thereinto, and the transmission expense TC in the list is accordingly updated. In this manner, as far as the content data CD becomes ready in the DCE 3 sooner than the user designated time limit LT, the user

settles for nothing, and if anything, has the merits of a cheaper ~~less~~ expense.

~~[0081]~~ Here, the processing unit 61 may carry out the same processing as described above when, in the addressee list L_{DEST}, one unit record UR_1 shows the cheapest transmission expense TC and the earliest time limit LT among ~~those~~ all of the unit records UR_1 corresponding to the same content data CD.

~~[0082]~~ Further, in the first embodiment, the DCE 3 is exemplified as simply transmitting the content data CD to the DTE 1 in response to a read request RS_{RO} from the DTE 1~~therefrom~~. This is not restrictive, and the processing unit 31 of the DCE 3 may delete the received content data CD from the content storage 35 immediately after the transmission of the content data CD or after a predetermined time interval. Alternatively~~Or~~, even if no read request RS_{RO} comes from the DTE 1, the processing unit 31 may store the received content data CD in the content storage 35, and then delete the content data CD after a predetermined time interval. If those are the cases, the timing of deletion is added to the transmission data TD before being transmitted to the DCE 3 or is previously registered in the DCE 3.

~~[0083]~~ In the first embodiment, as shown by the sequence SQ8 of FIG. 10, a storage completion notice AS_{CD} is exemplified as being transmitted to the DTE 1 from the DCE 3. This is not restrictive, and the server 6 may perform the transmission after receiving ~~received~~ the transmission data TD.

Also in the first embodiment, as shown by the sequence SQ1 of FIG. 9, the content reservation status data D_{RS} is exemplified as being transmitted to the DTE 1 via the DCE 3. This is not restrictive, and the DTE 1 may directly transmit the content reservation status data D_{RS} in response ~~responding~~ to the user's operation. In this case, the user refers to the content reservation status data D_{RS} on the DTE 1 which is not connected to the DCE 3. Note that~~,~~ the content reservation request RS_{TR} still needs to carry the identifier ID_{USER} of the DCE 3 as the content data CD is stored in the DCE 3.

~~[0084]~~ Also in the first embodiment, the server 6 is exemplified as including the addressee list storage 65, the charge list storage 66, the transmission expense list storage 67, and the transmission initial expense list storage 68. This is not restrictive, and the server 6 may be simply in charge of generating ~~generation~~ and transmitting ~~transmission of~~ the content reservation status data D_{RS} and transmitting ~~transmission of~~ the content data CD, and leave other processing to other equipment in the data network 7 or to some other server connected thereto.

~~[0085]~~ Also, the DCE 3 may be configured so as to also be ~~as~~ connectable ~~also~~ to a telephone and/or facsimile. If connected in such a manner, information such as service class comes over the first communication circuit 4, for example, together with audio data for telephone and/or character data for facsimile. Thus, the DCE 3 refers to such information and forwards the audio data

and/or character data to the telephone and/or facsimile, respectively, prior to the transmission data TD and content reservation status data D_{RS}. This is because such data needs to be responded to in real time.

~~[0086]~~ Also in the first embodiment, the timing of transmission is exemplified as being determined for every unit record UR_1 in order of the increasing time limit LT. This is not restrictive, and ~~determined may be~~ the transmission time may be determined. In such case ~~also~~, the transmission time also has to ensure the time limit LT.

~~[0087]~~ Further, in the first embodiment, the content data CD is exemplified as being stored in the content storage 64 together with the identifier ID_{CD} and the data size I_{DS} added thereto for clarity. This is not restrictive, and the content storage 64 stores only the content data CD, and assigns the identifier ID_{CD} that is unique thereto when the processing unit 61 generates the transmission data TD.

~~[0088]~~ Also in the first embodiment, ~~transmitted from the DCE 3 to the DTE 1 is~~ one content data CD is transmitted from the DCE 3 to the DTE 1. The number of content data CD is not restrictive, and the content data CD that are designated by read request RS_{RO} may be transmitted together with any other which is not designated thereby. If this is the case, the applicability is accordingly widened. For example, assume that a read request RD_{RO} is issued ~~made~~ for content data CD which is a movie. In response thereto,

the DCE 3 may transmit, to the DTE 1, the ~~thus~~ requested content data CD together with other content data CD which is an advertisement. Accordingly, the DTE 1 can display both the movie and the advertisement on its screen.

~~[0089]~~ Also in the first embodiment, the content data CD is exemplified as carrying moving picture data, static picture data, audio data, object data, character data, or a combination of two or more of such data. This is not restrictive, and the content data CD may also carry a program which changes the contents thereof (e.g., characters) for display. For example, when a program instructs the DTE 1 to display a letter of "A" in a first period but a letter of "B" in a second, the DTE 1 follows such an instruction.

~~[0090]~~ As another example, assume that a read request RD_{RQ} is issued ~~made~~ for the content data CD which is a WEB page. In response thereto, the DCE 3 may transmit, to the DTE 1, the ~~thus~~ requested content data CD together with other content data CD which is a banner advertisement (or an information link to advertisement), which is not requested by the user. Accordingly, the DTE 1 can display both the WEB page and the banner advertisement on its screen, thereby leading to advertisement revenue for information providers.

~~[0091]~~ Also in the first embodiment, the content data CD is exemplified as being chargeable. However, there may also be free content data. For any server containing only such free content data in the data transmission system, ~~there needs~~ only ~~to transmit~~

free content data needs to be transmitted to the DTE 1 via the DCE 3, if requested, without going through such processing as scheduling and charging in the first embodiment. In such a case, the DCE 3 counts how often the DTE 1 has so far requested the same free content data ~~so far~~. As for any free content data which is popular among users, the DCE 3 inquires, during when communications traffic of the first communications circuit 4 is low, the server if the content data has been updated. If the content data has been updated, the server responsively transmits the latest version of the content data CD to the DCE 3. The DCE 3 then stores the ~~thus~~ received content data CD in the content storage 35. As such, the DCE 3 may carry out cache processing so as to acquire any new free content data, autonomously, irrespective of whether a transmission request comes from the DTE 1. Unlike the DTE 1 which is basically turned ON and OFF by the user, the DCE 3 is always ON. This is the reason why the DCE 3 can carry out such a cache processing spontaneously.

~~[0092]~~ In the above-described ~~above~~ cache processing, the DCE 3 can know the level of the communications traffic with the following three techniques. First, the DCE 3 inquires any one of the exchange systems ~~system~~ 41 in the first communications circuit 4 about the current traffic level, and then uses a predetermined reference value for comparison therewith. Second, any one the exchange systems ~~system~~ 41 notifies the DCE 3 about the current traffic level, and the DCE 3 then uses the reference value for comparison.

Lastly, the ~~third,~~ DCE 3 is provided with a timer, and carries out the cache processing when the timer indicates a predetermined time. The time may be during ~~in~~ a period ~~during~~ from late-night to early-morning~~,~~ when the communications traffic is lowered on the first communications circuit 4.

~~[0093]~~ For the cache processing, the recording area in the content storage 35 is preferably divided into smaller areas. Some smaller areas of the content storage 35 are allocated for storing chargeable content data CDs, and some smaller areas are allocated for free content data that are acquired by the DCE3 through the cache processing. This prevents the recording area from being wholly occupied by the free content data after the cache processing.

~~[0094]~~ If ~~received~~ the transmission request is received from the DTE 1, the DCE 3 checks to see whether the content data CD that is designated thereby is stored in any of those smaller areas of the content storage 35. If the content data CD is stored in one of the smaller areas, the DCE 3 reads the content data therefrom without accessing ~~to~~ the server, and transmits the read content data ~~that~~ to the DTE 1. Such cache processing allows the DTE 1 to quickly acquire the content data at the user's request. Also, since the cache processing is carried out when the communication traffic level is low, the communications traffic can be controlled on the basis of time, thereby improving the first communications circuit 4 in transmission efficiency.

~~[0095]~~ In the first embodiment, the DCE 3 is exemplified as

acquiring the chargeable content data CD from the server 6. This is not restrictive, and the DCE 3 may carry out processing so as ~~to~~ share the free content data with other DCEs 3. In the process, the DCE 3 (the one which receives data) inquires other DCEs about the content data (especially the popular content data~~one~~). The ~~Those~~ inquired DCEs 3 responsively check themselves to determine if they are carrying the content data, and if any of the inquired DCEs ~~those~~ carries the content data, the content data is transmitted therefrom to the inquiring DCE 3.

~~[0096]~~ Alternatively, the server 6 manages information, in the form of a list, indicating which DCE 3 in the data transmission system carries what content data, and the server 6 transmits the list to the DCE 3 which is looking for any specific content data. With the help of this ~~such~~ list, the content data can be quickly located and acquired ~~only~~ by data communications only between two DCEs 3.

~~[0097]~~ Accordinly, by ~~By~~ sharing the content data among many DCEs, ~~as such,~~ server access is reduced, and further, the content data becomes quickly available if the content data is located in the closer DCE 3.

~~[0098]~~ In the case where ~~that~~ the DCE 3 wants to acquire a content data CD but ~~is in short of~~ the recording area in the content storage of the DCE 3 has an insufficient capacity to store the desired content data CD~~thereof~~, the DCE 3 requests ~~asks for~~ any of the other DCEs ~~DCE~~ 3 to store the content data CD therein. If the

request is accepted, the content data CD is stored in the other DCE 3 until the DCE 3 finds sufficient ~~any~~ room ~~therefor~~ in its recording area to store the desired content data CD. Then, the DCE 3 communicates with the other DCE 3 to acquire the content data CD therefrom.

~~[0099]~~ Here, the DCE 3 may be implemented with SMTP (Simple Mail Transfer Protocol) and POP (Post Office Protocol) to function as a mail server. If this is the case, as in the above, e-mails are preferably distributed when the communications traffic on the first communications circuit 4 is low. As to a high priority e-mail, however, the DCE 3 preferably distributes the high priority e-mail ~~that~~ regardless of the communications traffic on the first communications circuit 4. Here, since the DCE 3 ~~as~~ is powered ON all of the time, the DCE 3 always receive e-mails. The DTE 1 thus carries out an e-mail program, and accesses the DCE 3 responding to the user's operation to receive e-mails. In particular ~~It means~~, the DTE 1 receives e-mails from the DCE 3 in close proximity thereto without having to use ~~via~~ the first communications circuit 4, and thus, ~~whereby~~ those e-mails become available to ~~for~~ the user sooner.

~~[0100]~~ The DCE 3 may also be implemented with a program to realize a fire wall, which prevents malicious hackers from breaking into the DCE 3 and the DTE 1. More specifically, the DCE 3 carries a list indicating a qualified data addresser and addressee, and if any data comes from those that are not listed, the DCE 3 discards

the data. The DCE 3 also discards data that is addressed to an addressee which is not found in the list. Accordingly, the DTE 1 can be protected from so-called spam. For a case where a child operates the DTE 1, the list may be password protected so as to prevent the DTE 1 from receiving content data including sexual ~~sex~~ and violent ~~violence~~ descriptions or content. Further, the DCE 3 detects unauthorized data that are typified by a virus in data that is transmitted from/received by the circuit interface 33. Such ~~Those~~ detected unauthorized data are discarded with no exception, whereby the DTE 1 can be protected from virus infection.

~~[0101]~~ Also in the first embodiment, the DCE 3 responds to a read request RS_{RO} from the DTE 1, and transmits a content data CD itself to the DTE 1. Here, if the DCE 3 functions as a WWW server, the DCE 3 assigns the content data CD a URL (Uniform Resource Locator), and stores the URL ~~that~~ in the content storage 35. Also, the DCE 3 generates in advance an HTML file including a simple description of the assigned URL and the content data CD. Accordingly, the user can refer to any content data CD not only via the DTE 1 that is connected to the DCE 3 through the transmission path 2 but also via other equipment (e.g., a personal computer, a cellular phone, and an information mobile terminal) having a WWW browser that is implemented therein. The same is applicable if the DCE 3 generates an e-mail including a simple description of the assigned URL and the content data CD, and the DCE 3 accordingly transmits the e-mail with a preassigned e-mail address. Here,

whether the DCE generates ~~generating~~ the HTML file or e-mail may be up to the user based on the content data CD ~~basis~~.

Second Embodiment

~~[0102]~~ Described next is a data transmission system according to ~~of~~ a second embodiment of the present invention. Basically, the data transmission systems of the first and second embodiments are structurally the same as shown in FIG. 1, and herein, any component which is new in the second embodiment is described in detail, but the constituent elements of the data transmission system of the second embodiment which are the same as those of the first embodiment are otherwise provided with the same reference numeral as in the first embodiment and are not described again.

~~[0103]~~ Described first is the server 6, whose structure is shown in FIG. 3. However, in the second embodiment ~~here, stored in the content storage 64 is not the content data CD but,~~ as shown in FIG. 23a, several content data CD sets CDS are stored in the content data storage 64, not the content data CD as in the first embodiment. In FIG. 23a, each content data set CDS includes an identifier ID_{CDS}, a data size I_{DSS}, and several combinations of attribute information I_{AT} and corresponding content data CD. The identifier ID_{CDS} uniquely specifies the location where the content data set CDS is stored (i.e., the recording area in the content storage 64 of the server 6) in the data transmission system. The data size I_{DSS} indicates the content data set CDS by size, and the attribute information I_{AT} indicates the corresponding content data CD by attribute. With

regard to ~~About~~ the content data CD, no mention is given here as the content data CD is the same as in the first embodiment. Here, the content data set CDS may include the identifier ID_{CD} and the data size I_{DS} for the corresponding content data CD as in the first embodiment, but this is not essential here and is neither described nor shown.

~~[0104]~~ The content data set CDS is specifically described next. In the second ~~this~~ embodiment, the content storage 64 stores content data sets CDS_1 and CDS_2. The content data CDS_1 is presumably an advertisement this is made by a shop or a company, and carries p (a natural number equal to or larger than 1) content data CD_{11} to CD_{1p} each varying in content. The content data CD_{11} is provided with attribute information I_{AT11} corresponding thereto. Similar ~~Similarly~~ to other content data CD_{12} to CD_{1p}, attribute information I_{AT12} to I_{AT1p} is respectively provided.

~~[0105]~~ The attribute information I_{AT11} indicates the content data CD_{11} by attribute. Specifically, as shown by FIG. 23b, the attribute information I_{AT11} is composed of category information I_{CA11}, name information I_{SP11}, product information I_{GD11}, and price information I_{PR11}. The category information I_{CA11} indicates the advertisement that is specified by the corresponding content data CD_{11} by category, i.e., the advertiser's business. The name information I_{SP11} indicates the advertiser by shop or company name, the product information I_{GD11} indicates the product or service in the advertisement, and the price information indicates the price

of the product or service. Note that~~,~~ the attribute information I_{AT11} is not limited only to such a category, name, product, and price, and may, for example, also include information indicating the number of stocks of the product. Similar to the attribute information I_{AT11}, other attribute information I_{AT12} to I_{AT1p} is composed of, respectively, the category information I_{CA11} to I_{CA1p}, the name information I_{SP11} to I_{SP1p}, the product information I_{GD11} to I_{GD1p}, and the price information I_{PR11} to I_{PR1p}.

~~[0106]~~ Next, the content data set CDS_2 is herein presumably news, and carries q (a natural number equal to or larger than 1) content data CD_{21} to CD_{2q} each varying in content. The content data CD_{21} is provided with attribute information I_{AT21} corresponding thereto. Similar ~~Similarly~~ to other content data CD_{22} to CD_{2q}, attribute information I_{AT22} to I_{AT2q} is respectively provided. The attribute information I_{AT21} to I_{AT2q} indicates the corresponding content data CD_{21} to CD_{2q} by attribute, and, as shown in FIG. 23c, is specifically composed of the category information I_{CA21} to I_{CA2q} each varying in content depending on the corresponding content data CD_{21} to CD_{2q}. For example, the category information I_{CA21} to I_{CA2q} for the content data CDS_2 may be entertainment, finance, sports, and the like.

~~[0107]~~ Described next is the DCE 3. As shown in FIG. 24, the differences between the ~~this~~ DCE 3 of the second embodiment and the DCE 3 ~~that~~ (see FIG. 2) in the first embodiment are a selection condition list storage 36 and an allocation list storage 37. The

selection condition list storage 36 and the allocation list storage 37 store, respectively, a selection condition list L_{SC} and an allocation list L_{ST} (both will be described later).

~~[0108]~~ Described next with reference to the sequence charts of FIGS. 25 and 26 is the communications procedure for the DTE 1 to acquire a content data CD in the above structured data transmission system. ~~with reference to the sequence charts of FIG. 25 and 26.~~ The sequence chart of FIG. 25, as compared with the sequence chart ~~that~~ of FIG. 9, additionally includes steps ST21 and ST22, and sequence SQ21. The rest of FIG. 25 is basically the same as FIG. 9, and thus the steps and sequences which are the same as those in FIG. 9 are denoted by the same step and sequence numbers, and ~~described herein is~~ only a difference, if any between the respective steps and sequence numbers are described herein. As for the sequence chart of FIG. 26, as compared with the sequence chart ~~that~~ of FIG. 10, steps ST11 and ST14 are replaced by steps ST11' and ST14', and additionally includes ST23. The rest is basically the same as FIG. 10, and thus the steps and sequences which are the same as those in FIG. 10 are denoted by the same step and reference numbers, and ~~described herein is~~ only a difference, if any, between the respective steps and sequence numbers are described herein.

~~[0109]~~ First, in FIG. 25, the DTE 1 carries out selection condition setting request processing according to the user's operation (step ST21). More specifically, as shown in FIG. 27a,

the DTE 1 displays a selection condition input form IF_{SC}. The user operates the DTE 1 so as to input several keywords W_{KEY} into the selection condition input form IF_{SC}. Here, the keywords W_{KEY} are the ones which are used to define the content data CD by attribute. For example, if the user wants to see food advertisements carrying the lowest price, the user inputs the corresponding keywords W_{KEY} into the selection condition input form IF_{FS} to define what he/she wants. In response, the DTE 1 generates a selection condition setting request RS_{SCS}, which is a signal requesting the DCE3 to set a selection condition(s) SC therein to forward only content data CDs matching the user's preferences. The signal includes at least the identifier ID_{SCS} and the inputted keywords W_{KEY}, and the identifier ID_{SCS} therein specifies the signal as being a selection condition setting request RD_{SCS}. With the signal, the DCE 3 can grasp the user's preferences for the content data CDs.

~~[0110]~~ Such a selection condition setting request RS_{SCS} is converted into a format which is suitable ~~suited~~ for the transmission path 2 by the DTE 1, sent out onto the transmission path 2~~thereonto~~, and received by the user interface 32 of the DCE 3 (see FIG. 2) (sequence SQ21). Then, in the user interface 32, the selection condition setting request RS_{SCS} is reconverted before being received by the processing unit 31. The processing unit 31 then checks the identifier ID_{SCS} in the received signal to determine ~~see~~ if the signal is a selection condition setting request RS_{SCS}. If the signal ~~it~~ is a selection condition setting request

RS_{SCS}, the processing unit 31 carries out the selection condition setting request processing (step ST22). FIG. 28 shows the detailed processing procedure of step ST22. In FIG. 28, the processing unit 31 extracts the keywords W_{KEY} from the received selection condition setting request RS_{SCS} (step ST221). Then, the processing unit 31 assigns a unique selection condition number N_{SC} to a selection condition SC which is structured by the retrieved keywords W_{KEY} (step ST222). The processing unit 31 then accesses the selection condition list storage 36, and ~~to such selection condition list L_{SC} therein as shown in FIG. 27b,~~ adds the current set of the selection condition number N_{SC} and the selection condition SC in a selection condition list L_{SC} such as the one shown in FIG. 27b (step ST223). In such a form of the selection condition list L_{SC}, the user designated selection condition(s) SC are set to the DCE 3.

~~[0111]~~ After the ~~such~~ selection condition setting is completed~~through~~, ~~carried out in the data transmission system are~~ the same communications and processing are carried out in the data transmission system as in the first embodiment~~;~~ ~~,~~ that is, steps ST1 to ST10, and sequences SQ1 to SQ7 (see FIGS. 9 and 10). Note that~~,~~ although the processing was performed on the content data CD basis in steps ST1 to ST10 in the first embodiment, the processing in the second ~~this~~ embodiment is on the content data set CDS basis. In brief, the DTE 1 transmits a content reservation request RS_{TR} to the server 6 to request ~~ask~~ for the transmission of a content data set CDS. In response, with respect to the requested content

data set CDS, the server 6 carries out processing including scheduling, data transmission, charging, and the like. As a result, as compared with the transmission data TD of FIG. 13g, the transmission data TD that is transmitted in sequence SQ7 herein includes the identifier ID_{CDS} and the content data set CDS instead of the identifier ID_{CD} and the content data CD.

~~[0112]~~ As in the first embodiment, the transmission data TD is sent out onto an optimal communications circuit (the first or the second communications circuit 4 or 5). Herein, the optimal communications circuit is presumed to be the first communications circuit 4. The transmission data TD on the first communications circuit 4 is received by the circuit interface 33 of the DCE 3 via several exchange systems 41, and is then forwarded to the processing unit 31. Upon reception of the transmission data TD, the processing unit 31 carries out data storage processing (step ST11'). FIG. 29 shows the detailed processing procedure of step ST11'. As compared ~~Compared~~ with FIG. 22, step ST111 is replaced by steps ST111' and ST112' in FIG. 29. Other steps which are identical to those that are illustrated in FIG. 22 are denoted by the same step numbers, and are not described again. In FIG. 29, out of the received transmission data TD, the processing unit 31 stores at least the content data set CDS into a predetermined recording area of the content storage 35 (step ST111'). Here, the predetermined recording area is the one which is reserved in step ST5.

~~[0113]~~ Next, the processing unit 31 carries out update processing on the allocation list L_{ST} (step ST112'). More specifically, as for every content data CD that is currently stored in the content storage 35, the processing unit 31 adds, to an ~~such~~ allocation list L_{ST} such as the one shown in FIG. 30, an identifier ID_{CDS} of the content data set CDS, address information I_{ADD} specifying the location of the content data CD in the recording area, and date and time information I_{DT} indicating when the content data CD was stored (i.e., the current date and time). The allocation list LST also has ~~also~~ a section for a recording capacity C_{REC}, which indicates a current available capacity of the recording area of the content storage 35. Thus, with the content data set CDS stored in the content data storage 35 in step ST111', the processing unit 31 writes the resultant value into the recording capacity C_{REC}. After step ST112' is completed~~through~~, the procedure goes to steps ST112 and onwards, and the processing unit 31 transmits a storage completion notice AS_{CD} to the DTE 1 (sequence SQ8).

~~[0114]~~ After step ST12 is completed~~through~~, the storage capacity C_{REC} of the content storage 35 is decreased in value. Thus, the processing unit 31 carries out data deletion processing (step ST23). Step ~~Here, this step~~ ST23 corresponds to a data deletion part herein~~in claims~~, and FIG. 31 shows the detailed processing procedure thereof. In FIG. 31, the processing unit 31 extracts the current recording capacity C_{REC} from the allocation list L_{ST} (step ST231), and then measures its level by comparing the current

recording capacity C_{REC} with a reference recording capacity C_{REF} (step ST232).

~~[0115]~~ If the reference recording capacity C_{REF} is not less than the current recording capacity C_{REC}, the processing unit 31 determines that the recording area of the content storage 35 is ~~as being~~ still sufficiently available for recording a new content data CD, and step ST23 is now completed~~through~~. On the other hand, if the current recording capacity C_{REC} is not more than the reference recording capacity C_{REF}, the processing unit 31 determines that the recording area of the content storage 35 is ~~as being~~ running out, and thus the procedure goes to step ST233. Then, the processing unit 31 searches the allocation list L_{ST} for the oldest date and time information L_{DT}, and extracts the address information I_{ADD} corresponding thereto (step ST233).

~~[0116]~~ The processing unit 31 then deletes (erases), from the recording area that is specified by the retrieved address information I_{ADD}, the content data set CDS (step ST234). The processing unit 31 also updates the allocation list L_{ST} (step ST235). In more detail, the processing unit 31 deletes, from the allocation list L_{ST}, the date and time information I_{DT} and the address information I_{ADD} that are acquired in step ST233, and the identifier ID_{CDS} corresponding thereto. Then, the processing unit 31 updates the recording capacity C_{REC} in the allocation list L_{ST} to a value reflecting the deletion of the content data set CDS. After step ST235 is completed~~through~~, the procedure returns to step ST231

and repeats steps ST231 to ST235 until the recording capacity C_{REC} exceeds the reference recording capacity C_{REF}. In this manner, the recording area of the content storage 35 can be always available for data which is at least in size represented by the reference recording capacity C_{REF}.

~~[0117]~~ With the storage completion notice AS_{CD} that is received by the DTE 1, the procedure goes to step ST12. From now on, it is up to the user to decide when to operate the DTE 1 so as to read the content data CDS from the DCE 3. When the DTE 1 is operated, the DTE 1 generates a read request RS_{RO} (step ST13). In the second ~~this~~ embodiment, the read request RS_{RO} is a signal for requesting the DCE 3 to read the content data CDS at the user's request from the content storage 35.

~~[0118]~~ The read request RS_{RO} is transmitted from the DTE 1 to the DCE 3 (sequence SQ9). In response to the read request RS_{RO}~~,~~ the processing unit 31 of the DCE 3 carries out the data transmission processing of step ST14'. Step ~~Here, this step~~ ST14' corresponds to a data transmission part herein~~in claim 22~~, and FIG. 32 shows the detailed processing thereof. First, the processing unit 31 extracts every selection condition SC that is found in the selection condition list L_{SC} (see FIG. 27b) (step ST141'). Then, the processing unit 31 accesses the content storage 35 so as to selectively read any content data CD satisfying the retrieved selection conditions SC from the user designated content data set CDS (step ST142'). The processing unit 31 then transmits the read

content data CD(s) to the DTE 1 via the user interface 32 and the transmission path 2 (step ST143'). The DTE 1 then carries out output processing on the received content data CD(s) (step ST15), and ~~accordingly~~ the user can accordingly see what the content data CD(s) carry.

~~[0119]~~ Therefore~~As such~~, in the second embodiment, the user sets, to the DCE 3, a ~~such~~ selection condition SC such as the one shown in FIG. 27a to define what content data CD he/she wants. Assume here that five selection conditions SC as shown in FIG. 27b are set to the DCE 3. In response to the content reservation request RS_{TR}, the server 6 transmits a content data set CDS at the user's request to the DCE 3 with a timing that is determined through scheduling, and the DCE 3 stores the received content data that is set in the content storage 35. Here, transmitted from the server 6 are presumably the content data sets CDS_1 and DCS_2 of FIG. 33, each of which carries a plurality of content data CDs. Specifically, as shown in FIG. 33, the content data set CDS_1 includes an identifier ID_{CDS1}, a data size I_{DSS1}, and four content data CDs CD_{11} to CD_{14}. The content data CD_{11} carries category information I_{CA11} indicating as a food business, name information I_{SP11} as XX super market, product information I_{GD11} as a white radish, and price information I_{PR11} as ¥100. Similar ~~Similarly~~ to other content data CD_{12} to CD_{14}, attribute information I_{AT12} to I_{AT14} (category information I_{CA12} to I_{CA14}, name information I_{SP12} to I_{SP14}, product information I_{GD12} to I_{GD14}, and price information I_{PR12} to I_{PR14}) are

provided, respectively. The content data set CDS_2 includes an identifier ID_{CDS2}, a data size I_{DSS2}, and three content data CD_{21} to CD_{23}. Here, provided to the content data CD_{21} is category information I_{CA21} as entertainment, while provided to the content data CD_{22} and CD_{23} are ~~,~~ category information I_{CA22} and I_{CA23} as finance and sports, respectively.

~~[0120]~~ In such a case, after the processing unit 31 carries out the data transmission processing (step ST14') according to the selection conditions SC (see FIG. 27b), the content data CD_{11}, CD_{22}, and CD_{23} are selected and transmitted to the DTE 1 via the user interface 32. In the example of FIG. 34, although every information accompanying the CD_{11}, CD_{22}, and CD_{23} is transmitted, essentially, only the CD_{11}, CD_{22}, and CD_{23} will do. In such a data transmission system according to ~~of~~ the second embodiment, since the user sets his/her selection conditions SC to the DCE 3, the user can receive only content data CD of interest.

~~[0121]~~ Here, in the second embodiment, the content data CD_{11} to CD_{1p} are presumably all advertisements, and are accompanied by attribute information I_{AT11} to I_{AT1p} corresponding thereto. However, since the attribute (product price and the number of stocks) and details of the advertisement are changeable, some content data CD_1 and/or some attribute information I_{AT1} may be already out of date at about the time when the content data set CDS_1 reaches the DCE 3. To deal with this situation ~~that~~, the server 6 generates an information change request to be transmitted ~~for~~

~~transmission~~ to the DCE 3. Here, the information change request is a signal to request ~~ask~~ the DCE 3 to update the content data CD_1 and/or the attribute information to be the latest information, and the information change request includes the identifier ID_{CD1}, the content data CD_1 in the latest version, and/or the attribute information I_{AT1}. In response to such an information change request, the DCE 3 uses the identifier ID_{CD1} therein to specify the recording area where the content data CD_1 and/or the attribute information I_{AT1} is stored, deletes ~~delete~~ the content data CD_1 and/or the attribute I_{AT1} from the ~~thus~~ specified recording area, and then stores ~~store~~ the content data CD_1 in the latest version and/or the attribute information I_{AT1} in the content storage 35. With such processing, without transmitting the content data set CDS_1 in its entirety, the content data CD_1 and/or attribute information I_{AT1} ~~whichever needs change~~ can be accordingly changed whenever a change is needed. In this sense, the transmission bandwidth of the first and second communications circuits 4 and 5 can be effectively utilized. Note that~~,~~ a transmission timing of such an information change request is preferably determined in scheduling. It is preferable that ~~The sooner is the better for~~ the information change request reaches ~~to reach~~ the DCE 3 sooner.

~~[0122]~~ Also in the second embodiment, the DTE 1 first transmits a content reservation request RS_{TR} to the server 6 so as to acquire the content data set CDS_2 including various news. The content data set CDS_2, however, may be transmitted to the DTE 1 due to

push technology in some cases. To be more specific, the user of the DTE 1 sign-ups a distribution service of the content data set CDS_2 that is offered by the provider thereof (e.g., newspaper publishing company). In such a case, a server on the provider side requests for the server 6 to transmit the content data set CDS_2 to the DCE 3 corresponding to the requesting user. At this time, the server on the provider side notifies~~,~~ the server 6 of ~~,~~ the user's identifier ID_{USER}, the time limit LT, and the content data set CDS_2. In response to this notification, the server 6 generates transmission data TD by using the ~~thus~~ notified information.

~~[0123]~~ Also in the second embodiment, the out-of-date content data set CDS is deleted when the recording capacity C_{REC} of the content storage 35 is running short (see step ST23). This is not restrictive, and the out-of-date content data set CDS may be deleted when an expiration date previously provided thereto arrives~~comes~~. Alternatively~~Or~~, the out-of-date content data set CDS may be deleted with a lapse of a predetermined time that is measured from the time that ~~since~~ the content data set CDS was generated. Here, information indicating the date and time when the advertisement is made is previously provided to the content data set CDS. Such information indicating the expiration date and the date and time corresponds to deletion timing information herein~~in claims~~.

~~[0124]~~ Also in the second embodiment, the DCE 3 is exemplified as reading any content data CD satisfying the selection conditions

SC from the content storage 35 before transmitting the read content data CD ~~transmission~~ to the DTE 1. This is not restrictive, and the processing unit 31 may select any content data CD satisfying the selection conditions SC when receiving ~~received~~ the content data set CDS, and then store the content data CD(s) into the content storage 35. Further, the processing unit 31 discards any content data CD not satisfying the selection conditions SC. In this case, the processing unit 31 responds to the read request RS_{RO} from the DTE 1, and reads the content data CD that is selected at reception from the content storage 35 for transmission to the DTE 1. In this manner, the user can acquire content data CD of interest only, and further, a efficient use of the recording area of the content storage 35 can be achieved since ~~no~~ unwanted content data CD is not stored therein.

~~[0125]~~ While the present invention has been described in detail, the foregoing description is in all aspects illustrative and not restrictive. It is to be understood that numerous other modifications and variations can be devised without departing from the scope of the present invention.

ABSTRACT OF THE DISCLOSURE

A ~~In a data transmission system, a~~ content server transmits ~~6 sends out~~ content data designated by a content reservation request from a DTE ~~1~~ onto a first or a second communications circuit ~~4 or 5~~ for storage into a DCE ~~3~~ connected to the DTE ~~1~~. The content reservation request ~~also~~ indicates a time limit in which ~~by when~~ the designated content data is to be ready in the DCE ~~3~~. The content server ~~6~~ manages the ~~thus~~ designated time limit, and performs ~~. The content server 6 also carries out~~ scheduling processing. During the processing, based on both the managed time limit ~~under management~~ and predetermined communications information, ~~determined is~~ a transmission timing is determined which ensures that the content data is completely transmitted by the time limit, and which communications circuit ~~4 or 5~~ is optimal. ~~These are determined on the basis of both the managed time limit and predetermined communications information.~~ The content server transmits ~~6 then sends out~~ the content data onto the ~~thus~~ determined optimal communications circuit within ~~4 or 5 with~~ the determined transmission timing ~~determined through the scheduling processing~~. Accordingly, the data transmission system can achieve an efficient use of a communications circuit in terms of transmission bandwidth, and ~~data~~ download data from a server at a lesser ~~less~~ expense.